

Department of Veterans Affairs



Enterprise Architecture: Strategy, Governance, & Implementation

VA Enterprise Architecture Innovation Team

August, 2001

Secretary's Vision for Enterprise Architecture

The Department of Veterans Affairs will be recognized as the leader in Enterprise Architecture within the Federal government. We will continuously benchmark the quality and delivery of our service with the best available and use innovative means and high technology to deliver world-class services to our Nation's veterans and their families, and our employees. As the entrusted stewards of veterans information, we will ensure that only authorized personnel have access to veteran information and that our financial transactions are protected. Our highly skilled workforce of business and information technology professionals will be dedicated to ensuring that our Enterprise Architecture solutions are veteran-focused and developed in partnership with veterans groups and other organizations. Together, through our Enterprise Architecture, we will continuously strive to reach a higher standard in carrying out our vitally important mission.

Anthony J. Principi
Secretary of Veterans Affairs

Department of Veterans Affairs

Enterprise Architecture: Strategy, Governance, and Implementation

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What is Enterprise Architecture? – OMB A-130 Definition¹

An Enterprise Architecture is the explicit description and documentation of the current and desired relationships among program/business and management processes and information technology. It describes the "current architecture" and "target architecture" to include the rules and standards and systems life cycle information to optimize and maintain the environment which the agency wishes to create and maintain by managing its information technology portfolio. The Enterprise Architecture must also provide a strategy that will enable the agency to support its current state and also act as the roadmap for transition to its target environment. These transition processes will include an agency's capital planning and investment control processes, agency Enterprise Architecture planning processes, and agency systems life cycle methodologies.

The Enterprise Architecture will define principles and goals and set direction on such issues as the promotion of interoperability, open systems, public access, compliance with Government Paperwork Elimination Act, end-user satisfaction, and information technology security. The agency must support the Enterprise Architecture with a complete inventory of agency information resources, including personnel, equipment, and funds devoted to information resources management and information technology, at an appropriate level of detail. Agencies must implement the Enterprise Architecture consistent with the following principles:

- (i) Develop information systems that facilitate interoperability, application portability, and scalability of electronic applications across networks of heterogeneous hardware, software, and telecommunications platforms;
- (ii) Meet information technology needs through cost effective intra-agency and interagency sharing, before acquiring new information technology resources; and
- (iii) Establish a level of security for all information systems that is commensurate to the risk and magnitude of the harm resulting from the loss, misuse, unauthorized access to, or modification of the information stored or flowing through these systems.

¹ Office of Management and Budget, *OMB Circular No. A-130*, November 30, 2000. <http://www.whitehouse.gov/omb/circulars/a130/a130trans4.html>

Executive Summary²

This document presents the Department of Veterans Affairs (VA) Enterprise Architecture strategy that was developed and unanimously approved by the VA Enterprise Architecture Innovation Team. Established by the Secretary of Veterans Affairs, this team, made up of VA senior management business line and information technology professionals, identified and adopted the Zachman Enterprise Architecture framework to organize VA's Enterprise Architecture, and decided how that architecture will be governed and implemented. The strategy provides for a governance system based on decentralized implementation of information technology and centralized management of Enterprise Architecture in an atmosphere of collaboration, accountability, and oversight.

The Enterprise Architecture Innovation Team crafted the VA Enterprise Architecture mission in May 2001 and, over the course of the next 60 days, worked together through many intense long weekend sessions to develop a VA Enterprise Architecture strategy that will be sustainable over time. Guided by the strategic objectives of VA, this strategy is consistent with the legal requirements of the Clinger-Cohen Act and OMB A-130. The mission statement is as follows:

“The mission of VA’s Enterprise Architecture is to develop and implement an evolutionary, high-performance One-VA information technology architecture aligned with our program/business goals that enables enterprise-wide data integration. VA’s Enterprise Architecture will enable us to provide an accessible source of consistent, reliable, accurate, useful, and secure information and knowledge to veterans and their families, our workforce, and stakeholders to support effective delivery of services and benefits, enabling effective decision-making and understanding of our capabilities and accomplishments. The Enterprise Architecture will support VA’s overall strategic goals.”

This document is strategic. It provides general guidelines on what needs to be done, who will do it, and when it will be completed. As examples, and for additional guidance, incorporated, by reference and in the appendices, are some tactical and operational details including a preliminary listing of implementation action items and a timetable. It contains sufficient detail to demonstrate that VA can and will, implement and use Enterprise Architecture in a manner that has utility and will be institutionalized as the new way in which information assets are developed and managed in VA. This Enterprise Architecture strategy is an important reference for VA enterprise architects, executives, program/business managers, and information technology managers and workers. Many of VA’s 200,000+ staff will refer to this strategy to better understand technology planning and implementation. It represents a new beginning.

² An annotated version of this Executive Summary is contained in *Appendix D: Executive Summary [Annotated]* beginning on page 57 of this document.

VA's Enterprise Architecture is the "blueprint" for systematically and completely defining and documenting the organization's current (baseline) and desired (target) environment, and includes a sequencing plan for transitioning from the baseline environment to the target environment. VA's Enterprise Architecture strategy is essential for evolving its information systems and developing new systems with optimized mission value. This is accomplished in program/business terms (e.g., mission, objectives, goals, program/business functions, and information flows) and technical terms (e.g., software, hardware, data, communications, and system environments).

VA's Enterprise Architecture builds on the interdependencies and interrelationships within VA's program/business operations facilitating the development of information technologies supporting those operations. Both the Office of Management and Budget and the General Accounting Office report that without a complete and enforced Enterprise Architecture, Federal agencies run the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and interface.

Using a disciplined and rigorous approach, this strategy guides VA in defining, implementing, using, and maintaining its Enterprise Architecture. It describes major Enterprise Architecture governance and program management areas, including organizational structure and management controls, a process for the development of a baseline and target architecture and the development of a sequencing plan. It also describes Enterprise Architecture maintenance and implementation, as well as oversight, control, evaluation, assessment, resource allocation, and project management. It is organized into five main chapters, a brief description of which follows:

- **The Foundation of VA's Enterprise Architecture** – This chapter addresses the missions of VA and its Enterprise Architecture, as well as the goals and objectives, guiding principles and legislation, uses and benefits, strengths, issues, challenges, opportunities, and the need and audience for an Enterprise Architecture in VA.
- **Enterprise Architecture Governance in VA** – This chapter explains the governance process for developing and maintaining VA's Enterprise Architecture, and how Enterprise Architecture compliance is integrated with VA's governance processes. This chapter provides direction on who has responsibility and authority to develop and maintain VA's Enterprise Architecture, and how Enterprise Architecture compliance is integrated into VA's overall information technology investment review and project approval processes. It also includes consideration for security, improved project management, and the sociological aspects of managing change.
- **VA's Enterprise Architecture Framework Selection & Use** – This chapter describes the Zachman Framework which was chosen to organize VA's Enterprise Architecture. It discusses how an architecture is used, its

scope and depth; and the selection criteria used by VA's Enterprise Architecture Innovation Team.

- **Development & Deployment of VA's Enterprise Architecture** – This chapter provides a high-level overview of VA's development and implementation of an Enterprise Architecture "blueprint" using the Zachman Framework. Outlining the essential elements, this chapter provides guidance concerning definition and development, organizational structure and management controls, processes for development and maintenance of baseline and target architectures, and of a sequencing plan for evolving information technologies in order to optimize their mission value.
- **Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture** – This chapter describes the methods and processes used to evaluate the effectiveness of VA's Enterprise Architecture. The efficacy and value of the Department's Enterprise Architecture must be constantly assessed.

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1.0 The Foundation of VA's Enterprise Architecture

1.1 Introduction

On Wednesday, April 4, 2001, the Secretary of Veterans Affairs appeared before the House Veterans' Affairs Subcommittee on Investigations and Oversight and promised to reform the way VA does information technology. He pledged to define an Enterprise Architecture that will end the practice of 'stove-pipe' systems design, incompatible systems development, and the collection of data that does not yield useful information. He committed to deliver this plan to the Congress in a matter of months.

On April 26, 2001 the Secretary established the VA Enterprise Architecture Innovation Team to deliver on these very aggressive promises. The team, made up of 21 VA senior management business line and information technology professionals, over the course of about 60 days beginning on May 10, including many intensive long weekends, developed and unanimously approved a VA Enterprise Architecture strategy that will be sustainable over time. Guided by the strategic objectives of VA, this strategy is consistent with the legal requirements of the Clinger-Cohen Act and the Office of Management and Budget Circular number A-130.

This document is VA's guide for defining, implementing, and maintaining its Enterprise Architecture to support program/business processes in a disciplined and rigorous manner. It prescribes guiding principles, selection and establishment of an organizing framework, outlines development and deployment actions, and institutionalizes the evolution and evergreening of the Enterprise Architecture.

The guide is modeled after *A Practical Guide to Federal Enterprise Architecture, Version 1.0*, Chief Information Office Council, February 2001. It is based on the General Accounting Office's information technology investment management framework³ that was developed to provide a common structure for discussing and assessing information technology capital planning and investment control practices at Federal agencies.

VA's Enterprise Architecture is essential for achieving the Department's mission through optimal performance of core program/business processes operating within an efficient information technology environment. It is the Department's "blueprint" for systematically and completely defining and documenting the organization's current (baseline) and desired (target) environment. VA will accomplish this in logical or program/business terms (e.g., mission, program/business functions, and information flows) and technical terms (e.g., software, hardware, communications, and systems environments). This includes a sequencing plan for transitioning from the baseline environment to the target environment.

³ *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity* (GAO/AIMD-10.1.23, Exposure Draft, 2000).

1.2 VA Mission, Vision, and Goals

“To care for him who shall have borne the battle and for his widow and his orphan.”

These words, spoken by Abraham Lincoln during his Second Inaugural Address, reflect the philosophy and principles that guide VA in everything we do, and are the focus of our endeavors to serve our Nation’s veterans and their families. This is VA’s mission. VA’s vision for the future is:

As the Department heads into the 21st century, we will strive to meet the needs of the Nation’s veterans and their families today and tomorrow. We will become an even more veteran-focused organization, functioning as a single, comprehensive provider of seamless service to the men and women who have served our Nation. We will continuously benchmark the quality and delivery of our service with the best in business and use innovative means and high technology to deliver world-class service. We will foster partnerships with veterans organizations and other stakeholders making them part of the decision-making process. We will cultivate a dedicated VA workforce of highly skilled employees who understand, believe in, and take pride in our vitally important mission.

To implement this mission and vision, VA has established the following strategic goals:

- Restore the capability of disabled veterans to the greatest extent possible and improve the quality of their lives and that of their families.
- Ensure a smooth transition for veterans from active military service to civilian life.
- Honor and serve veterans in life and memorialize them in death for their sacrifices on behalf of the Nation.
- Contribute to the public health, socioeconomic well being, and history of the Nation.
- Create an environment fostering the delivery of One VA world-class service to veterans and their families through effective communication and management of people, technology, program/business processes, and financial resources.

1.3 VA Enterprise Architecture Mission, Goals, and Objectives

The mission of VA’s Enterprise Architecture is to develop and implement an evolutionary, high-performance One VA information technology architecture aligned with VA program/business goals that enables enterprise-wide data integration.

VA’s Enterprise Architecture will enable the Department to provide an accessible source of consistent, reliable, accurate, useful, and secure information and knowledge to veterans and their families, our workforce, and stakeholders to

support effective delivery of services and benefits, enabling effective decision-making and understanding of our capabilities and accomplishments. The Enterprise Architecture will support VA's strategic goals.

The goals and objectives of VA's Enterprise Architecture are to ensure that:

- Veterans will feel that we know who they are, we will answer their questions about their issues, we will effectively provide end-to-end services without frustrating them, they will have access to our systems for their own needs, and they will believe that VA staff and systems are here to serve and honor them.
 - Self-service by Internet and phone will be available to veterans, 24 hours a day, 7 days a week.
 - Applications for benefits will be able to be submitted by veterans through the Internet.
 - Telephone service and information centers will be enhanced to enable easy access to information and services.
 - Kiosks will be installed to provide access to information about benefits and services.
- VA will implement a One VA information framework supporting cost-effective data integration and information sharing across program/business lines to provide a “single” source of consistent, reliable, accurate, timely, and secure information to veterans and their families, employees, and other stakeholders.
 - Veterans will never have to register with VA more than once.
 - Veteran information will be available anywhere, anytime, to any authorized user in real time.
 - Telemedicine use will be enhanced to improve timeliness and quality of care for veterans and maximize remote provider consultation.
 - Enterprise Architecture will foster the organization and presentation of all relevant patient data in a way that directly supports clinical decision-making and program analysis. Timely access to clinical information by VA staff from multiple sites of care is paramount to ensure prompt service, continuity, and quality care.
 - Common and core data will be shared by VA's operating elements, ensuring accessibility and avoiding redundancy.
 - Sharing and use of information with VA's external partners will be enhanced. The partners include: the Social Security Administration; the Department of Defense; Health and Human Services; and other federal, state, and local governments; educational institutions; lending institutions; and other program/businesses.

- VA information systems will be high-performance systems that meet or exceed exemplary standards in businesses and government agencies.
 - Information systems characteristics will be adaptable, scalable, extensible, standards-based, open systems, maintainable, reliable, secure, component-based, common services oriented, best appropriate technology, veteran-connected, and principle-based.
 - The “gold standard” will be established for information related to veteran care and an “information supply chain” that clearly articulates ownership.

1.4 VA Enterprise Architecture Strategic Strengths, Issues, Challenges, and Opportunities

The VA Enterprise Architecture will change the way the Department manages its information technology resources. VA will draw upon its strategic strengths and take advantage of the new opportunities that will be possible through the implementation of this new way of doing business. The successful implementation of Enterprise Architecture is not without risk. VA is committed to addressing these challenges and working to influence, to the maximum extent possible, those strategic issues that are not within its immediate control. Key strategic strengths, opportunities, challenges, and issues include:

- Strengths
 - The Commitment and dedication of the VA Enterprise Architecture Innovation Team to develop VA’s Enterprise Architecture.
 - Absolute top-level commitment to Enterprise Architecture by the Secretary and understanding leaders.
 - A Collaborative Enterprise Architecture governance process.
 - A Highly committed employees to VA mission to serve veterans.
 - The VA Enterprise Architecture was developed in true One VA approach and the One VA approach provides the foundation and accountability for all new information technology projects.
- Issues
 - The Information Age is happening, VA must adapt.
 - The Complexity will increase by orders of magnitude.
 - Our stakeholders must accept VA’s Enterprise Architecture approach and support its implementation.

The Administration and Congress must provide adequate resources for the planning and implementation of VA’s Enterprise Architecture.

- Challenges
 - Funding for VA’s Enterprise Architecture (overall VA and program/business requirements) must be sufficient, and funding issues must be handled fairly.
 - Ensuring VA has a strong, skilled, highly trained, and motivated staff (including the Chief Enterprise Architect) to plan and implement VA’s Enterprise Architecture across the Department, and the ability to contract for high quality support.
 - Obtaining internal stakeholder acceptance of VA’s Enterprise Architecture and the organizational changes that it entails through effective marketing and communications to all levels.
 - Developing a balanced set of measures to assess the value and performance of VA’s Enterprise Architecture.
 - Continuing to work collaboratively ensuring implementation of the VA Enterprise Architecture.
 - Adhering to the VA Enterprise Architecture Innovation Team’s intention to fulfill the promise of a One VA Enterprise Architecture preventing “stove pipe” recidivism, and overall loss of momentum.
 - Developing models and tools for VA’s Enterprise Architecture and completing the engineering before the manufacturing of the VA Enterprise Architecture.
 - Migrating the existing legacy systems into the new VA Enterprise Architecture environment.
 - Reducing total cost of ownership while improving service.
 - Ensuring meaningful and timely review of VA’s Enterprise Architecture and project implementation.
- Opportunities
 - Increase in funding for information technology initiatives from Congress because of an aligned VA Enterprise Architecture.
 - Greatly improve the alignment of information technology and VA’s programs/businesses, positive changes to VA program/business processes, and building security into VA’s Enterprise Architecture from the outset.
 - Enhance employee morale and performance.
 - Lead the Federal Government in making Enterprise Architecture work for a large enterprise.
 - Reduce total cost of information technology ownership and improve veteran’s service simultaneously.

- Demonstrate to veterans that VA is doing all that is possible to enhance its provision of comprehensive, high quality, and seamless service to veterans and their families.

It is also recommended that a Project Management Office be established in the Office of the Chief Information Officer. The Project Management Office will provide a consistent Departmental approach for project and risk management and serve as a source of expertise to program/business unit project teams, facilitate project risk management, evaluation, and contingency planning for people, program/business, and technology risks for the portfolio of information technology projects in VA.

The Project Management Office will provide tools, training, and consulting advice to help ensure that appropriate project management tools, processes, and best practices are used for project planning and management, as well as, publishing project metric and status reporting on a consistent basis for all projects within VA. The Project Management Office will also provide oversight and early warning of changes or slippages in project schedule, functionality, or deliverables that will impact other projects including those in VA's Enterprise Architecture sequencing plan.

1.5 VA's Enterprise Architecture Guiding Principles

VA's Enterprise Architecture principles represent fundamental requirements and practices believed to be good for the organization. These principles will be refined to meet Departmental program/business needs.

The VA recognizes that Departmental program/business needs cannot be effectively defined merely by Chief Information Officers and other executives. The "problem" and much of the "solution" must come from managers in terms of program/business process, and people "on the front lines" in terms of functional requirements. It is possible to map specific actions, such as Enterprise Architecture design and development, systems acquisitions, and implementation, to these architectural principles.

Deliberate and explicit standards-oriented policies and guidelines for VA's Enterprise Architecture development and implementation will be generated in compliance with the principles. Each (and every) phase of the systems life cycle is supported by the actions necessitated by these architecture principles. Capital planning and investment control actions will be governed by the implications of these principles. The following are VA's Enterprise Architecture guiding principles:

- VA's Enterprise Architecture and systems will be veteran-focused, and adhere to the maximum value principal, which states that information management decisions provide maximum performance and value to the enterprise, and the veterans it serves.

- VA's Enterprise Architecture and systems will be designed to adapt to changing program/business needs.
- System changes, integration, and new initiatives will be completed by the earliest feasible date.
- Data is a corporate asset will be shared with all who have a need and authorization to know.
- VA's Enterprise Architecture will comply with the law as expressed in legislative mandates such as Individuals with Disabilities Section 508 of the Rehabilitation Act, executive orders, Federal Regulations, and other Federal guidelines.
- Security will be designed into all architecture layers (applications, data, network, systems) balancing the need for data protection with the need for accessibility and ease of use; security architecture will be simple and integrated, ensure privacy, authenticate users, and prevent unwarranted access.
- Systems will be non-redundant and cost-effective.
- VA's Enterprise Architecture will be collaboratively governed.
- Data, technology, and vocabulary will be standardized.
- Workforce acceptance, alignment, and capabilities concerning VA's Enterprise Architecture initiatives will be monitored and appropriate changes recommended to social and cultural processes to promote the architecture's sustainability and renewal.

More specifically, VA's Enterprise Architecture will have the following attributes:

- Support VA Information Technology Strategic Plan that in turn supports the overall VA Strategic Plan (current version is for FY 2001 – 2006).
- Provide for maximal program/business-technical alignment by being part of an approval process for information system projects that flows from the respective program/business/information owners through the information technology governance process to the Strategic Management Council as described in *Chapter 2: Enterprise Architecture Governance in VA*.
- Support the One VA vision of information technology enhanced customer service, including customer service, customer self-service, internal data sharing and exchange, external data sharing and exchange (federal and non-federal government), customer outreach and feedback, and a mechanism for sharing services.
- Promote "just in time" service to veterans, their families, employees, and external stakeholders.

- Reduce redundancy of information technology systems and data, seek commonality across program/business lines, and promote interoperability across VA's enterprise.
- Adhere to vendor neutral, open systems principles and practices, and common services.
- Provide metrics to evaluate success of Enterprise Architecture and information technology initiatives.
- Ensure maintainability, reduce complexity, and increase quality of information technology systems.
- Ensure communications are compatible, interoperable, and cost-effective from communications point (node) to communications point to successfully send and receive messages between enterprise components.
- Ensure program/business rules are enforced consistently from system/application to system/application to coordinate and/or change behavior within the enterprise.
- Ensure that program/business and information technology requirements use commercial off-the-shelf technology rather than customized or in-house solutions unless otherwise justified. Such decisions must be based on total lifecycle costs and total cost of ownership.
- Exploit the communications vehicle of the Internet to the maximum extent possible, making systems web-enabled, accessible, and connected.
- Standardize end-user application interfaces so that navigation among applications is similar, reducing training costs.
- Provide for a complete repository (actual or virtual) of veterans' and active service members' data (e.g. basic eligibility, demographic and military history) that will be the authoritative source of data accessed by all VA employees and systems that have the need and authorized use for that data.

1.6 Enterprise Architecture Legislation and Guidance

The Office of Management and Budget and General Accounting Office assert that without a complete and enforced Enterprise Architecture, federal agencies run the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and interconnect.

Congress requires Federal agency Chief Information Officers to develop and maintain an integrated Enterprise Architecture with the passage of the Clinger-Cohen Act⁴ in 1996. Office of Management and Budget guidance provides for the

⁴ Public Law 104-106, section 5125, 110 Stat. 684 (1996).

content of Agency Enterprise Architectures.⁵ Similarly, the Chief Information Officer Council, the Department of the Treasury, the National Institute of Standards and Technology, and the General Accounting Office have developed architecture frameworks or models that define the content of Enterprise Architectures.⁶

The Clinger-Cohen Act holds VA's Chief Information Officer responsible for developing, maintaining, and facilitating the implementation of a Department-wide Enterprise Architecture. Additionally, within the Federal government there are numerous rules, regulations, and guidelines that govern the development and execution of information technology policy in order to better manage strategic plans, enhance information technology acquisition practices, justify information technology expenditures, measure information technology performance, report results to Congress, integrate new technologies, and manage information resources including:

Executive Order 13011, Federal Information Technology, established the Federal Chief Information Officer Council as the principal interagency forum for improving practices in the design, modernization, employment, sharing, and performance of Agency information resources.

Federal Enterprise Architecture Framework (FEAF), dated September 1999 — issued by the Federal Chief Information Officer Council. The FEAF provides guidance for developing, maintaining, and facilitating Enterprise Architectures in the Federal government. The Chief Information Officer Council began developing the Federal Enterprise Architecture Framework in April 1998 in accordance with the priorities enunciated in Clinger-Cohen and issued it in 1999.

A Practical Guide to Federal Enterprise Architecture, dated February 2001 — issued by the Federal Chief Information Officer Council. This guide is intended primarily for Federal Agency architects tasked with the generation and institutionalization of Enterprise Architectures. VA's Enterprise Architecture is based largely on the information provided in this document.

Architecture Alignment and Assessment Guide, produced for the Federal Chief Information Officer Council's Federal Architecture Working Group (FAWG), dated October 2000. Sections 1 through 3 describe information technology reform and its evolution. The guide highlights the Office of Management and Budget guidance directed to the Federal community, which extended information technology reform beyond the Clinger-Cohen Act.

⁵ OMB Circular A-130, *Management of Federal Information Resources*, November 30, 2000.

⁶ *Federal Enterprise Architecture Framework, Version 1.1*, Federal Chief Information Officers Council, September 1999; *Treasury Enterprise Architecture Framework, Version 1*, the Department of the Treasury, July 3, 2000; the National Institute of Standards and Technology's Enterprise Architectural Model, referenced in NIST Special Publication 500-167, *Information Management Directions: the Integration Challenge*; and *Strategic Information Planning: Framework for Designing and Developing System Architectures* (GAO/IMTEC-92-51, June 1992).

Smart Practices in Capital Planning, produced by the FAWG and the Capital Planning and Information Technology Management Committee, dated October 2000.

The Office of Management and Budget Circular number A-130 has an explicit description and documentation of the organization's current architecture, target architecture, and sequencing plan, and addresses interoperability, portability, scalability, cost-effective inter-agency and intra-agency sharing, and security.

Together with the General Accounting Office and the Office of Management and Budget guidance, these documents provide guidance on the interaction and integration of the capital planning and investment control and Enterprise Architecture processes. Collectively, these documents describe the capital planning and investment control and Enterprise Architecture processes working as a governance mechanism to ensure successful organizational change and information technology investments to support that change. Additional sources of mandates, drivers, and guidance for VA's Enterprise Architecture include:

- Government Paperwork Elimination Act.
- Freedom of Information Act and Amendments.
- Government Performance Results Act of 1993.
- Office of Management and Budget Circular A-11.
- General Accounting Office guidance, findings, and recommendations.
- Federal Chief Information Officer Council documents.
- Various sections of Title 40 and Title 44 US Code.

1.7 The Need for a VA Enterprise Architecture

The primary purpose of an Enterprise Architecture is to *inform, guide, and manage* the decisions for the enterprise, especially those related to information technology investments. The true challenge of enterprise engineering is to maintain the architecture as a primary authoritative resource for enterprise information technology planning and implementation. This goal is not met via enforced policy alone, but by the value and utility of the information provided by the Enterprise Architecture.

While various frameworks and models provide valuable guidance on the content of Enterprise Architectures, there is almost no Federal guidance on how to successfully manage the process of creating, changing, and using the Enterprise Architecture other than *A Practical Guide to Federal Enterprise Architecture* issued by the Federal Chief Information Officer Council.

VA specific guidance is critically important for optimizing the program/business value and mission performance of the Department's systems. Effective development of a complete Enterprise Architecture requires Department-wide

commitment with senior leadership sponsorship that is managed by an organizational entity held accountable for success. Effective Enterprise Architecture implementation requires establishment of architectural requirements for new and existing information technology systems and continuous assessment and enforcement of compliance.

Enterprise Architecture governance and management processes incorporate both compliance and participation throughout the organization in order to promote ownership, utility, and sustainability. Without these commitments, responsibilities, and tools, the risk is great that new systems will not meet program/business needs, will be incompatible, will perform poorly, and will cost more to develop, integrate, and maintain than is warranted. Therefore, waivers of these requirements, if any, may occur only after careful, thorough, and documented analysis.

1.8 The Audience for this Guide

This guide is a primary source of information for VA enterprise architects tasked with the generation and institutionalization of VA's Enterprise Architecture. It will also serve those participating in, and affected by, VA's Enterprise Architecture. This guide and VA's Enterprise Architecture are important references for VA executives, program/business unit managers, and information technology managers who manage technology and technology investments. It is also aimed at capital planning and investment control process participants (e.g., investment review boards, Office of Management and Budget), as well as VA enterprise engineering and program management process participants (e.g., program/project managers, systems engineers, application architects, systems developers, configuration managers, risk managers, social process managers, and security engineers).

Many of VA's 200,000+ staff members will reference the VA Enterprise Architecture and this guide to better understand technology planning so they may better serve the veteran. This document provides guidance and instructions for developing an Enterprise Architecture allowing VA to benefit from improvements in development and maintenance activities. It provides guidance to executive management and Chief Information Officers for educating and obtaining key stakeholder commitment in establishing and using the VA Enterprise Architecture effectively.

See *Appendix A: Readings and References* for a listing of references, suggested readings, and other information used in creating this document.

2.0 Enterprise Architecture Governance in VA

2.1 Introduction

This chapter presents an overview of the structures (i.e., organization) and processes (i.e., activities) of overall VA governance, describes the structure and processes of VA's Enterprise Architecture governance and how it fits into overall VA governance. The roles and responsibilities of VA's Chief Enterprise Architect are described as well as how VA's Enterprise Architecture processes are integrated with VA's information technology investment and project approval processes.

2.2 Applicability

All VA systems will be included within the Department's Enterprise Architecture. VA will develop, follow, and enforce policies and procedures that define and maintain its Enterprise Architecture. VA's Enterprise Architecture governance organization and processes will mature over time and various levels of detail are expected for different categories of systems. Systems will be engineered to a degree and timetable to be specified by the governance process according to categories such as:

- infrastructure and networks,
- legacy applications,
- in-process applications,
- new initiatives,
- ad hoc/demand systems required for special/specific short-term needs, and
- stand-alone applications.

All systems will be reported. The scope, impact and demands on infrastructure, cost, data sharing, interoperability, and interface criteria within and outside VA will also determine the required level of detail to be reported.

2.3 Overview of VA Governance and Enterprise Architecture Governance

In May 2001, the Secretary approved the establishment of a new VA governance framework. The purpose of this framework is to establish the structure, process, and procedures for the development of recommendations for the Secretary regarding policy, planning, and management of issues. This framework establishes a process for reviewing the implementation of new initiatives and program performance in key areas. It also establishes two new forums (also called "fora"). The first is VA's Executive Board, chaired by the Secretary. The second forum is the Strategic Management Council, chaired by the Deputy Secretary. The Council has broader membership and is responsible for reviewing

all major policy and management issues, assessing options, and making recommendations to the Secretary through VA's Executive Board.

As Chair of VA's Executive Board, the Secretary reviews and approves VA's Enterprise Architecture, the membership of the Information Technology Board, and policies, plans, and new initiatives associated with the Enterprise Architecture. The composition, roles and responsibilities, and objectives of the Information Technology Board, which is the information technology initiative review board for the Department, is discussed later on in this chapter.

Full participation of VA's program/business and information technology communities is essential for VA's Enterprise Architecture to be successful. The governance process ensures that the Enterprise Architecture is kept current and becomes part of VA's overall decision-making processes. To contribute effectively to VA's mission and strategic goals, and improve the delivery of benefits, services, and information to the veteran, the governance of VA's Enterprise Architecture must flow from VA's corporate governance and be aligned with it.

The VA Strategic Plan must drive VA's Enterprise Architecture and the Enterprise Architecture must define the supporting information systems required to achieve that plan. Therefore, VA will ensure Enterprise Architecture compliance by developing and implementing effective governance processes and procedures for VA's Enterprise Architecture.

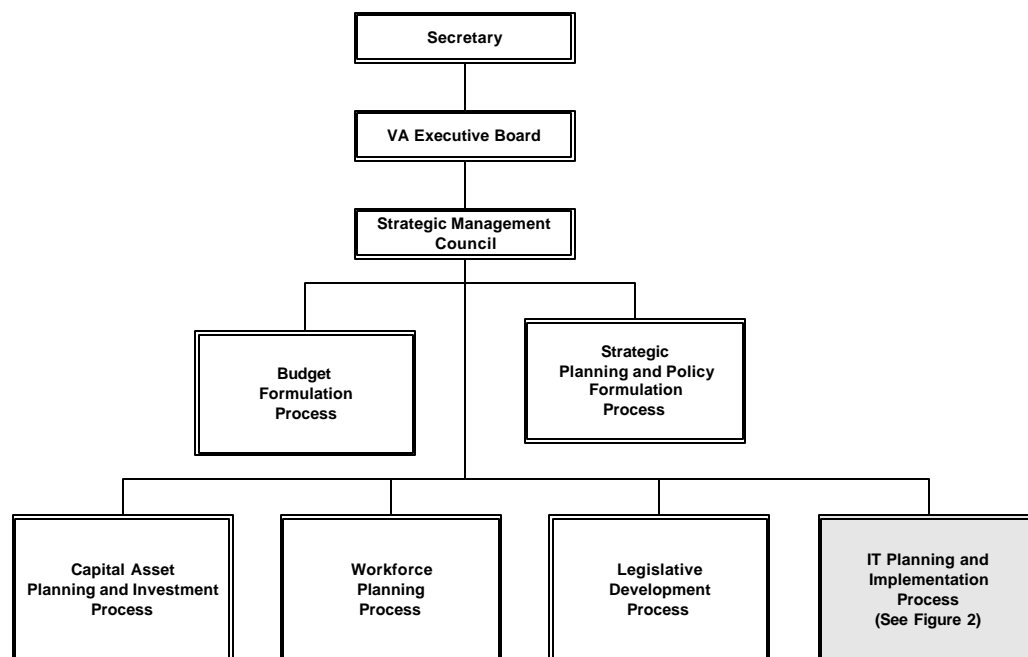


Figure 1. VA's Governance Framework (i.e., Structures and Processes)

Figure 1 summarizes the organizational structure of overall VA governance and the processes that support it. The Enterprise Architecture governance processes are part of VA's governance processes for information technology and, as such, are incorporated within the existing VA governance framework as indicated by the highlighted box in Figure 1.

The processes and structures of VA Enterprise Architecture governance are designed to leverage overall VA governance processes and structures. VA's Enterprise Architecture governance consists of a collaborative structure that includes full participation by VA's program/business and information technology communities. This degree of participation from both VA program/business and VA information technology communities is critical to the successful implementation, maintenance, and long-term relevance of information technologies and Enterprise Architecture in VA.

2.3.1 VA's Information Technology Planning Process

The core of VA Enterprise Architecture governance is the information technology planning process established by the Secretary. The information technology planning process is responsible for aligning information technology with the program/business needs and strategic goals of VA. The information technology planning process strives for a total collaboration of program/business with information technology, and consists of the following four functions or processes:

- Enterprise Architecture
- Capital Investment
- Security Certification and Accreditation
- Project Management

The information technology planning process supports the review of information technology investment proposals for compliance with VA's Enterprise Architecture. The Information Technology Board oversees this process. The Assistant Secretary for Information and Technology (who is also VA's Chief Information Officer), as the process owner of the information technology planning process, is the steward responsible and accountable for creating, leveraging, coordinating, and implementing VA's Enterprise Architecture. The Information Technology Board is composed of VA's Chief Information Officers and senior program/business executives from each administration and staff office. As shown in Figure 2, this board is accountable to VA's Strategic Management Council and ultimately to the VA Executive Board chaired by the Secretary.

Administration-specific committees that report to their Under Secretaries also link into the Information Technology Board and thereby participate in VA's technology governance processes. The objectives and responsibilities of the Information Technology Board are as follows:

Objectives:

- Ensure the VA Enterprise Architecture alignment and integration between information technology and program/business goals and processes.
- Ensure adequate funding and commitment to initiatives and the enterprise information technology infrastructures.

Responsibilities include:

- Developing and recommending to the Strategic Management Council the direction for VA's Enterprise Architecture.
- Establishing and communicating the executive direction for the use of information technology.
- Ensuring the interests of program/business and information technology representatives from all major VA entities are considered in VA's Enterprise Architecture.
- Ensuring a viable integrated VA Enterprise Architecture is in place covering a rolling multi-year period.
- Ensuring that the Enterprise Architecture is current and provides complete and accurate descriptions of the baseline environment, the target vision, and the sequencing plan to take VA from the baseline (sometimes called "as-is") to the target (sometimes called "to-be") environments.
- Ensuring the suitability and consistency of technology investments with VA's Enterprise Architecture and strategic objectives.
- Ensuring that the information technology planning process addresses sociological change management, security, project management, and capital investment as well as VA Enterprise Architecture concerns.

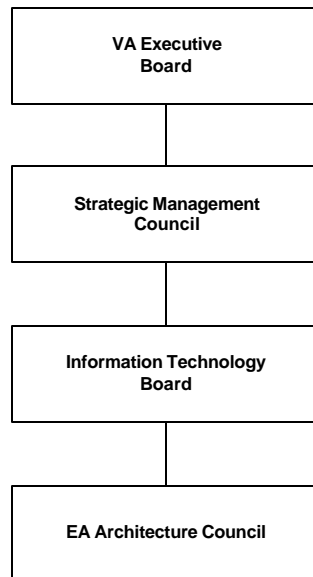


Figure 2. VA's Enterprise Architecture Governance Structure

2.3.2 Overall VA Enterprise Architecture Governance

The purpose of Enterprise Architecture governance is to manage, control, and monitor Enterprise Architecture activities and progress. Figure 2 illustrates the structure of VA's Enterprise Architecture governance. This organization structure, its processes and procedures, and its roles and responsibilities, facilitate and advance the performance of VA's Enterprise Architecture.

The role of the Enterprise Architecture Council is to oversee and guide Enterprise Architecture issues for the Department, and continuously develop and refine VA's Enterprise Architecture to meet changing veteran needs, strategic goals, and the incorporation of new technologies. This Council is composed of the Chief Enterprise Architects in the administrations and staff offices and reports to VA's Information Technology Board for information technology planning process purposes. The Enterprise Architecture Council responsibilities include three processes: the Enterprise Architecture executive steering process, Enterprise Architecture business management process; and the Enterprise Architecture compliance education and enforcement process. The Chief Enterprise Architect is the process owner.

2.4 Roles and Responsibilities of VA's Chief Enterprise Architect

VA's Enterprise Architecture is a formal program initiated and endorsed by the Secretary of the Department of Veterans Affairs. As such, the program warrants a formal management structure, within the Office of VA's Chief Information Officer, consisting of information technology experts, program/business experts, and technologists. The major component of this management structure is the Office of Chief Enterprise Architect led by VA's Chief Enterprise Architect. The Chief Enterprise Architect provides management and support of the Enterprise Architecture and reviews proposed projects for Enterprise Architecture compliance. The term "compliance" when applied to VA's Enterprise Architecture is not binary but represents different degrees of alignment to VA's Enterprise Architecture in terms of program/business objectives and technical standards.

VA's Chief Enterprise Architect reports to VA's Chief Information Officer. The Chief Enterprise Architect is responsible for leading the development of VA's Enterprise Architecture and ensuring the integrity of the architectural development processes and the content of the Enterprise Architecture products. The Chief Enterprise Architect is the ombudsman to the information technology and program/business line units, and ensures that program/business unit processes are emphasized in the Enterprise Architecture. The Chief Enterprise Architect is also responsible for ensuring that the Enterprise Architecture provides the best possible information and guidance to information technology projects and stakeholders, and that systems development efforts are properly aligned with program/business unit requirements.

VA's Chief Enterprise Architect is also the manager of VA's Enterprise Architecture. In this role, the Chief Enterprise Architect has management responsibility for the Enterprise Architecture program, with the authority, responsibility, and accountability for the overall Enterprise Architecture effort. In this regard, the Chief Enterprise Architect is responsible for the planning, staffing, and the ultimate success of the Enterprise Architecture program, including acquisition of sustaining funding, negotiating schedules, and the timely and accurate delivery of the Enterprise Architecture products (or "artifacts").

The Chief Enterprise Architect, in collaboration with the Information Technology Board, or its designee, will periodically refine the schedule and enhance the requirements for more comprehensive reporting, and in collaboration with the system owners, define the category of the system and the expected impact on VA Enterprise Architecture. There will be a sequencing of systems into the VA Enterprise Architecture; the first being those that are considered mission-critical, followed concurrently by in-process, new, and legacy systems.

The core competencies of the Chief Enterprise Architect include leadership skills, a comprehensive knowledge of Enterprise Architecture and requisite skills, and critical understanding of the role and relationship of information technology to supporting the programs/businesses of VA. The Chief Enterprise Architect must be an effective communicator who can bridge the cultural differences that often exist between the program/business and systems organizations, and among agencies, and facilitate interaction and cooperation.

The Chief Enterprise Architect provides a high-level project management framework for VA's Enterprise Architecture project portfolio; and facilitates the evaluation and management of project, people, program/business, and technology risks and contingency plans, for the portfolio of information technology projects in VA. The Chief Enterprise Architect also provides consulting advice to help ensure appropriate Enterprise Architect and project management tools, processes, and best practices will be used for project planning and management, and facilitates the collection and publishing of project metrics and status reporting on a consistent basis for all information technology projects within VA.

The Chief Enterprise Architect is responsible for defining and managing the change management process, which includes changes to Enterprise Architecture products, processes, and technologies. VA's Chief Enterprise Architect also advises senior managers of the potential human impacts involved in VA's Enterprise Architecture and information technology changes, including change planning, management, and communication processes in planning and implementing projects as defined in Enterprise Architecture sequencing plans.

2.5 Integrating VA's Enterprise Architecture with VA's Information Technology Investment and Project Approval Processes

Compliance with VA's Enterprise Architecture is a critical success factor. As stated earlier, full participation from both VA program/business and information

technology communities is also an important factor to VA's Enterprise Architecture implementation and long-term relevance. Linking VA's Enterprise Architecture alignment review with VA's investment process is necessary to achieve the full benefits of both the Enterprise Architecture and information technology investments. Investment proposals often reflect changes in the organization's program/business functions as well as providing a window to technology advancements. This information is valuable as a feedback loop to VA's Enterprise Architecture planning and development function because the architecture must be changed to reflect current program/business functions and advances in technology must be considered when updating the Enterprise Architecture.

The integration of all three factors (i.e., program/business, technology, and investment) is illustrated in Figure 3, which shows that VA's Enterprise Architecture process guides the Department's investment process and the investment process yields information that guides changes to the Enterprise Architecture. This interaction results in Architecture Alignment and Assessment, thus VA's Enterprise Architecture facilitates the integration and alignment of program/business, technology, and investment.

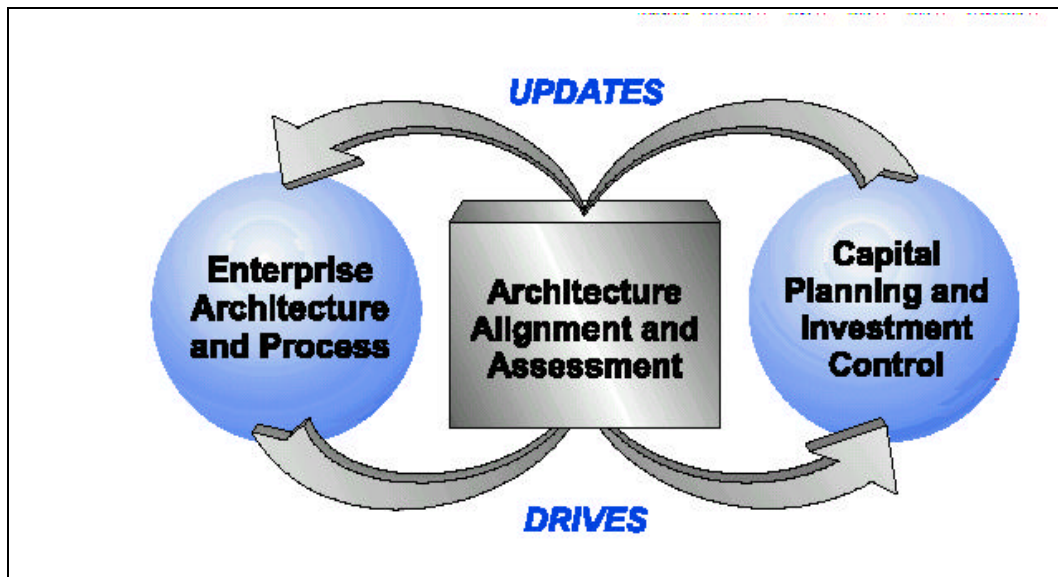


Figure 3. VA's Architecture Alignment and Assessment Process

2.6 Developing Policy for VA's Enterprise Architecture

VA's Chief Enterprise Architect will advise the Information Technology Board on VA's Enterprise Architecture policy, process, and information technology; and develop policies for the type and level of architectural documentation required for legacy, in-process, infrastructure, new, and other categories of systems. These policies will address:

- Project investment approval process – describing the steps for obtaining approval and funding.
- Relationship and integration of VA's Enterprise Architecture process to the capital investment process.
- Conducting in-process and post-implementation reviews.
- Waivers procedures for specific projects.
- Penalties for noncompliance to VA's Enterprise Architecture and standards.
- Workforce impacts of VA's Enterprise Architecture and information technology project changes.
- Project management considerations.

3.0 Enterprise Architecture Framework Selection & Use

3.1 Introduction

VA evaluated the available architectural frameworks and selected the Zachman Enterprise Architecture Framework to organize and structure VA's Enterprise Architecture. This chapter describes that framework and the reasons it was chosen by VA's Enterprise Architecture Innovation Team. The values, philosophies, and objectives for VA's Enterprise Architecture as described in the Secretary's vision and *Chapter 1: The Foundation of VA's Enterprise Architecture* shaped this decision process.

3.2 Basic Concepts

The Office of Management and Budget requires Federal Enterprise Architecture frameworks to document the linkages between the mission and goals of the organization, information, content, and information technology capabilities. Further, the framework must identify and document the:

1. program/business process,
2. information flow and relationships,
3. applications,
4. data descriptions and relationships, and
5. technology infrastructure.

VA's selection of the Zachman Framework ensures compliance with these Office of Management and Budget requirements.

3.2.1 Architecture Use

The purpose of VA Enterprise Architecture is closely tied to the Department's Strategic Plan, legislation such as Clinger-Cohen, and support of the capital investment process. Before an enterprise architect begins to describe an Enterprise Architecture, the organization determines the nature of the changes the architecture is intended to facilitate, the issue(s) the architecture is intended to explore, the questions the architecture is expected to help answer, and the interests and perspectives of the Enterprise Architecture audience and users. The purposes of VA's Enterprise Architecture will evolve over time to meet new requirements. The Chief Enterprise Architect is responsible for ensuring that the evolution of VA's Enterprise Architecture meets the newly determined requirements. This increases the efficiency of the architecture development process and creates greater balance and flexibility in the resulting architecture and the systems that it defines.

3.2.2 Architecture Scope

It is critically important that VA's Enterprise Architecture development be approached in a top-down, incremental manner, consistent with the hierarchical architectural views that are the building blocks of proven Enterprise Architecture frameworks. In doing so, it is equally important that the scope of the higher-level program/business views of VA's Enterprise Architecture span the entire Department.

3.2.3 Architecture Depth

The greatest value is obtained from the implementation of an Enterprise Architecture when consistent, high levels of detail about all applications, processes, and infrastructures are captured. VA's Chief Enterprise Architect in collaboration with the Enterprise Architecture Council and Information Technology Board will establish the appropriate levels of detail and timeframes for capturing applications, processes, infrastructure, and systems.

3.3 Enterprise Architecture Framework Criteria







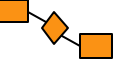
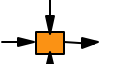
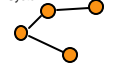
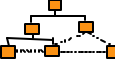

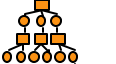
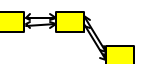
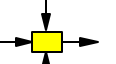
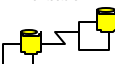
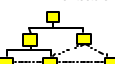


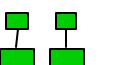
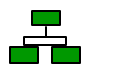
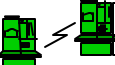
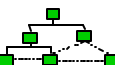








Frameworks include concepts that drive and organize the types of architectural products being created. The products, both graphical and textual descriptions, capture the information prescribed by the framework. Equivalent products may be substituted if the new product has similar or more extensive attributes than the original product. This is often done when specific methods (e.g., object-oriented analysis and design) lend themselves to particular modeling techniques. VA's Chief Enterprise Architect is responsible for the approval of specific types of Enterprise Architecture products and tools for the Department.

VA used a variety of criteria in the selection of their Enterprise Architecture framework. Among the decisive factors were the requirements that a framework be:

- understandable,
- usable in the short term,
- endure with long-term value,
- complete and comprehensive, leading to improved service to veterans,
- credible and able to meet federal requirements,
- support a high-performance enterprise architecture,
- capable of allowing strategic linkage of program/business goals to information technology,
- accommodate clearly defined program/business rules, and
- scalable, extensible, and flexible.

3.4 Enterprise Architecture Framework Choice: The Zachman Framework for VA's Enterprise Architecture

Consideration was given to the currently popular frameworks used to construct Enterprise Architectures. Several frameworks available were found to be robust enough to support the complexity inherent in the Department of Veterans Affairs and given strong consideration. Of the frameworks considered, the Zachman Framework for Enterprise Architecture was the unanimous choice of the VA Enterprise Architecture Innovation Team. It was found to be the most advanced, best understood, easiest to use, most supported, most accepted, as well as offering the most granularity, completeness, and flexibility. The Zachman Framework is depicted in Figure 4.

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)							SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Mean=Major Bus. Goal/ Critical Success Factor	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)							ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity Rein = Business Relationship	Proc. = Business Process I/O = Business Resources	Node = Business Location Link = Business Linkage	People = Organization Unit Work = Work Product	Time = Business Event Cycle = Business Cycle	End = Business Objective Means = Business Strategy	<i>Owner</i>
SYSTEM MODEL (LOGICAL)							SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity Rein = Data Relationship	Proc. = Application Function I/O = User Views	Node = I/S Function (Processor, Storage, etc) Link = Line Characteristics	People = Role Work = Deliverable	Time = System Event Cycle = Processing Cycle	End = Structural Assertion Means = Action Assertion	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)							TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. Rein = Pointer/Key/etc.	Proc. = Computer Function I/O = Data Elements/Sets	Node = Hardware/System Software Link = Line Specifications	People = User Work = Screen Format	Time = Execute Cycle = Component Cycle	End = Condition Means = Action	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)							DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field Rein = Address	Proc. = Language Stmt I/O = Control Block	Node = Addresses Link = Protocols	People = Identity Work = Job	Time = Interrupt Cycle = Machine Cycle	End = Sub-condition Means = Step	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

Source: Zachman Institute for Framework Advancement, <www.zifacom>, as of July 2000

Figure 4. Zachman Framework for Enterprise Architecture

In September 1987, John Zachman published an article in the *IBM Systems Journal* identifying what he called “A Framework for Information Systems Architecture,” sometimes simply referred to as “The Zachman Framework.” This framework has grown to become a de-facto standard for Enterprise Architecture development. In fact, the Zachman Framework provides much of the foundation for the Federal Enterprise Architecture Framework and the frameworks of several Federal Departments and Agencies.

The basic idea behind the Zachman Framework is that the same complex thing or item can be described for different purposes in different ways using different types of descriptions (e.g., textual, graphical). The Zachman Framework provides the thirty-six necessary categories for completely describing anything; especially complex things like manufactured goods (e.g., appliances), constructed structures (e.g., buildings), and enterprises (e.g., VA and all of its goals, people, and technologies). The framework provides six increasingly detailed views or levels of abstraction from six different perspectives. These levels of abstraction form the rows of the framework and, as adapted to describing enterprises, the rows of the Zachman Enterprise Architecture Framework are as follows:

1. The Planner or Ballpark View
2. The Owner's or Enterprise Model View
3. The Designer's or Systems Model View
4. The Builder's or Technology Model View
5. The Subcontractor's or Detailed Representation View
6. The Functioning Enterprise or Actual System View

In addition, the six categories of Enterprise Architecture components, and the underlying interrogatives that they answer, form the columns of the Zachman Enterprise Architecture Framework and these are:

1. The Data Description — What
2. The Function Description — How
3. The Network Description — Where
4. The People Description — Who
5. The Time Description — When
6. The Motivation Description — Why

In Zachman's opinion, the single factor that makes his framework unique is that each element on either axis of the matrix is explicitly distinguishable from all the other elements on that axis. The representations in each cell of the matrix are not merely successive levels of increasing detail, but actually are different representations — different in context, meaning, motivation, and use. Because each of the elements on either axis is explicitly different from the others, it is possible to define precisely what belongs in each cell.

For further readings and more detailed information on the Zachman Framework, please refer to any of John Zachman's publications listed in *Appendix A: References and Suggested Readings*, the Zachman Institute for Framework Advancement web site (<http://www.zifa.com/>), and publications by other authors such as Melissa A. Cook's text, *Building Enterprise Information Architectures: Reengineering Information Systems*, Prentice Hall, Upper Saddle River, NJ, 1996. This appendix also contains a list of other related resources.

VA will derive the following benefits from using the Zachman Framework:

- Improved information technology budget management/efficiencies.
- Increased responsiveness to changing program/business and information technology conditions.
- Improved communication between program/business and information technology that contributes to alignment necessary to achieve VA's mission.
- Improved data sharing to those who have a need.
- Fully documented and effective corporate repository.
- Standardized technology and data across VA.

3.5 Framework Products of Special Note

A number of framework products are important enough to warrant particular mention. These include a baseline architecture, target architecture, and security architecture. Additional details about creating and implementing them in VA, as well as the Zachman Framework, Technical Reference Model, Standards Profile, and sequencing plan, are provided in *Chapter 4: Development & Deployment of VA's Enterprise Architecture* and *Chapter 5: Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture*.

- **Baseline Architecture**

The baseline Enterprise Architecture may be thought of as a temporal view of the present-day VA organization and its technology and process environment. As such, this profiles the existing architecture of the full spectrum of the functioning VA enterprise. Moreover, it is the reality of the bottom row of the Zachman Framework as described in the other 30 cells. The baseline architecture focuses on in-place program/business activities and systems/technologies.

- **Target Architecture**

The target Enterprise Architecture is the second temporal view captured within the context of the Zachman Framework and contains the desired target elements of the enterprise. When compared to the baseline depiction, the gap analysis can be performed to establish a formal sequencing plan to take VA from the present baseline to the future target through a series of project initiatives organized into a sequencing plan.

- **Security Architecture**

A fully developed security architecture affects all cells of the Zachman Framework and all information technology in VA. VA's security architecture is a tiered (or layered) hierarchy of architectures. The tiers consist of VA security program elements that address all aspects of VA

directed policy and standards, common security directions, intra-Administration integration, and VA's overarching security architecture. The Administration security tiers address individual Administration architectural needs stemming from law, regulation, policy, and program/business area requirements. VA's Security Architecture describes and discusses actual (baseline) and desired (target) systems within VA's security domain. It is based on descriptions of services, infrastructures (which are groups of related services), and applications. Relationships between these infrastructures are represented as part of the descriptions of the services and security applications.

4.0 Development & Deployment of VA's Enterprise Architecture

4.1 Introduction

This chapter describes VA's Enterprise Architecture development and deployment, organizational structure and management controls, processes for development of baseline and target architectures, and development of a sequencing plan for evolving information systems and developing new systems that optimize their mission value.

The following factors are critical to the successful development and deployment of VA's Enterprise Architecture and the application of the Zachman Framework.

- Architectural models are comprised of the same architectural documents or products that VA enterprise uses to evaluate, make, and communicate decisions, and not just after-the-fact documentation.
- There is organizational commitment to enforce the rigor of the VA's Enterprise Architecture and maintain a robust Enterprise Architecture information repository.
- Funding for information technology initiatives is tied directly to compliance with VA's Enterprise Architecture and alignment with VA goals and objectives.
- Identifying and documenting business processes, information flows and relationships, applications, data, descriptions and relationships, and technology infrastructures.

4.2 Developing the VA Enterprise Architecture

After the Office of the Chief Enterprise Architect is established, one of the next steps is to create the architectural products based on the architecture's purpose and the chosen Zachman Framework.

A consistent approach to developing the baseline and target architectures must be followed. The selected approach should include:

1. Constructing a VA Enterprise Architecture Program Management Plan
2. Data collection
3. Preliminary product generation
4. Review and revision
5. Publication and delivery of the architecture products to an appropriate Enterprise Architecture repository

Developing an Enterprise Architecture is a new activity for VA and the Department realizes that there is much to learn. Due to their complexity and possible importance to VA, the VA Enterprise Architecture Innovation Team identified three initiatives to serve as VA Enterprise Architecture pilot projects:

- coreFLS
- One VA Registration/Eligibility
- HealtheVet

4.2.1 Developing the VA Enterprise Architecture Program Management Plan

The Chief Enterprise Architect will create a VA Enterprise Architecture Program Management Plan to delineate a set of activities to develop, use, and maintain the Enterprise Architecture. Oversight and control procedures will be developed, documented, and implemented within the Program Management Plan to facilitate the tracking of cost, schedule, and performance data. The Program Management Plan will be developed based on best program/business and project management practices such as those discussed in *A Practical Guide to Federal Enterprise Architecture*.

4.2.2 Developing the VA Enterprise Architecture Marketing Strategy and Communications Plan

To ensure effective development and deployment of VA's Enterprise Architecture, a marketing strategy and communications plan will be established by the Chief Enterprise Architect and approved by the Information Technology Board to continually inform and educate VA's senior executives, program/business units, information technology community, and other employees and stakeholders about VA's Enterprise Architecture.

4.2.3 Initiating the Definition and Development of VA's Enterprise Architecture

In the first phase of the process of implementing VA's Enterprise Architecture, the Department will focus on the planner's and owner's perspectives (i.e., the top two rows of the Zachman Framework) and the data, network, and motivation views (i.e., the what, where, and why columns). Subsequent phases will be determined by the results of the first phase. The following is a list of the Chief Enterprise Architect's initial priority projects and a tentative timetable is provided in *Appendix B: Preliminary Project Timetable*:

- Design, develop, and maintain VA's Enterprise Architecture repository.
- Incorporate new information technology projects into VA's Enterprise Architecture.
- Incorporate ongoing information technology projects into VA's Enterprise Architecture.

- Conduct the baseline VA Enterprise Architecture build-out beginning with a baseline inventory.
- Establish the target architecture.
- Incorporate and maintain VA's Technical Reference Model and Standards Profile.
- Conduct a target to baseline gap analysis and begin work on the sequencing plan.

4.3 Designing, Developing, and Maintaining VA's Enterprise Architecture Information Repository

An Enterprise Architecture information repository manages an entire portfolio of architectural products. VA's Enterprise Architecture repository will accommodate approved product forms in all thirty-six cells of the entire Zachman Framework to varying levels of detail.

The repository provides a powerful enterprise-wide knowledge base. It directly promotes maximizing our service to the veteran by introducing a focal point, or common ground, even a language, for promoting alignment among the cells of the Zachman Framework and thereby across all of VA. VA's Enterprise Architecture repository will help the Department perform activities such as identifying program/business process redundancy, cross-administration information flows, systems duplication, and many other analytical and design operations. The repository provides a holistic view of VA's program/business, information management, and information technology assets and relationships.

4.3.1 Organizational Commitment

The establishment of this comprehensive repository carries with it a significant responsibility for widespread participation. It requires major organizational commitment for VA executives, planners, owners, designers, builders, subcontractors, and enterprise architects to work as one team. Adequate resources to populate, maintain, and grow the repository are required. A highly functional repository is one of the most important critical success factors in the management of an effective Enterprise Architecture program in VA.

4.3.2 Repository Development and Maintenance Process

The approach VA is taking in the development and deployment of an Enterprise Architecture information repository is to build, develop performance measures, measure results, and implement course corrections as needed. The first step is to begin the process to identify suitable architectural product forms and tools for their creation and maintenance, and identifying a repository tool/platform to store and manage all the architectural products.

The following three processes will be initiated: tying the repository population activities with the governance process for new projects; building out the Scope and Enterprise model rows of the Zachman Framework; and, developing the baseline of VA's existing portfolio of systems.

The process of taking VA's existing system portfolio and retrofitting architectural artifacts or products into the repository is already underway with the initiation of the baseline inventory. This involves a myriad of activities due, in part, to the diversity of VA and its information technology portfolio in terms of age, size, technology base, and utilization.

The Chief Enterprise Architect will establish a schedule for completing the Enterprise Architecture documentation of all of VA's information technology. Specific content requirements and delivery schedules for each information technology will vary. The infrastructure/application system manager, owner, or custodian is responsible for completing, or at least collaborating in the creation of the VA Enterprise Architecture documentation and creating the VA Enterprise Architecture products following the requirements and using the tools provided by the Chief Enterprise Architect.

The intention of this process is to document both the target (through a process of forward engineering) and the baseline (through a process of reverse engineering) Enterprise Architectures. The Chief Enterprise Architect will determine the appropriate Enterprise Architecture products and levels of detail for each cell of the Zachman Framework.

4.4 Incorporating and Maintaining VA's Technical Reference Model and Standards Profile

The Department's Technical Reference Model provides a vocabulary that defines architecture components such as service areas, interface categories, and their interrelationships. The model and its described services establish the ground rules for constructing consistent systems and technology solutions hand-in-hand with the Zachman Framework. VA currently uses a Technical Reference Model based upon the Institute of Electrical and Electronics Engineers model, although some thought is being given to simplifying this fully robust reference model.

VA's Standards Profile reflects Departmental agreement on standards to be used in building systems. It identifies the government, industry, de-facto, and other standards that VA organizations will use for acquiring and implementing information technology products. The VA Standards Profile uses widely supported federal and industry standards to promote open systems solutions and to make it easier to extend the architecture to emerging technologies and products. VA's Chief Enterprise Architect via VA's Enterprise Architecture governance process selects standards for inclusion in VA's Standards Profile from national, international, or federal standard organizations and other sources. These include sources such as the American National Standards Institute, Federal Information Processing Standards, the International Standards Organization, the Institute of

Electrical and Electronics Engineers, the International Telecommunications Union, and the Internet Engineering Task Force. The security profile includes a security standards profile that is specific to the security services as specified in the VA Security and Enterprise Architectures.

The VA Technical Reference Model and Standards Profile is a collaborative effort of VA's component organizations. It is forward-looking and enterprise-wide, requiring all VA organizations to participate in its management. It is aimed at helping information technology systems sponsors and project managers select design options and products that promote Department-wide interoperability and information sharing.

The Chief Enterprise Architect must create, maintain, and enforce the Technical Reference Model and Standards Profile. The Chief Enterprise Architect is also responsible for implementing the Security Standards Profile.

This remainder of this section presents the purpose and benefits of VA's Technical Reference Model and Standards Profile, VA Enterprise Architecture standards adoption and retirement processes, and the relationship of VA's Technical Reference Model and Standards Profile to VA's Enterprise Architecture.

4.4.1 Purpose and Benefits of VA's Technical Reference Model and Standards Profile

VA's Technical Reference Model and Standards Profile provides program and project managers and system designers the information they need to:

- Formulate information technology applications and system architectures that are standards based, and
- Evaluate how well projects align with Departmental architectural objectives and standards.

The benefits to be gained by using a common, standards-based approach to information technology systems implementation include:

- Foster interoperability through standardization.
- Increased information systems security.
- Increased user and information technology worker productivity.
- More consistent and integrated view of VA applications and information protecting the confidentiality, integrity, and availability of systems and data.
- More reuse of existing infrastructure and automated solutions.

- Faster delivery of information technology and reliable automated solutions.
- Lower system life cycle cost and total cost of ownership.

4.4.2 Standards Adoption and Retirement Processes

The Chief Enterprise Architect will establish a process for the selection, adoption, approval, and retirement of standards from national, international, or Federal standard organizations as well as other sources. The Standards Profile will evolve with changes in technology and user requirements, by adopting some standards and retiring others.

4.4.3 Standards Profile and Technical Reference Model Relationship to VA's Enterprise Architecture

VA's Technical Reference Model and Standards Profile provide a suite of common standards supported throughout VA. VA's Enterprise Architecture allows VA organizations to exercise some discretion and control over specific products and systems, while moving VA toward a simplified technical environment, greater integration at lower cost, and common implementations for infrastructure and shared services. The VA Enterprise Architecture defines the Technical Reference Model and Standards Profile, leading to adoption and retirement of standards and achieving the goals of interoperability and simplicity. The Standards Profile maps to specific Technical Reference Model services, including security, application programming interface(s), communications, human/computer interaction, information and systems services.

4.5 Establishing, Updating, and Realizing VA's Target Architecture

The target architecture defines the future vision of VA's Enterprise Architecture. The sequencing plan defines the steps (i.e., projects) that will take VA from the baseline architecture to the target architecture.

4.5.1 Defining and Refining VA's Target Architecture

Starting with the enterprise mission, the target Enterprise Architecture describes VA's future state. The target architecture illustrates the future capabilities and technologies resulting from design enhancements to support changing VA's program/business needs.

The target architecture is determined by outside forces such as legislation, Office of Management and Budget policy, veteran demographic changes, and industry trends such as technology, housing, education, and health care, as well as internal VA program/business units identifying and cataloging what major program/business processes will be new and/or different in the future.

As an integral part of this process, VA derives the target architecture, conducts the associated gap analysis, and defines the sequencing plans to implement

change. The transition from the baseline to the target architecture requires involvement of many groups in VA, using VA's Enterprise Architecture governance process, which has representation from both the information technology and program/business communities. It also includes technical activities, such as migration planning, configuration management, and engineering change control; project management considerations; as well as organizational change management concerns.

Documentation products used in this planning become the contents in VA's Enterprise Architecture repository at the appropriate level of detail. The process of maintaining and refining these products is iterative. To maintain the alignment of the target architecture and associated transitional processes that move the organization forward, VA continuously:

- interprets emerging laws and regulations,
- assesses changing veterans needs,
- evaluates VA program/business objectives,
- evaluates emerging technologies,
- aligns veterans' needs, VA program/business objectives, and information technology initiatives,
- gains concurrence across the veteran service community, and
- supports "out-of-the-box" thinking about how VA can better serve the needs of veterans.

4.5.2 Sequencing Plan for New and Evolving VA Information Systems

The changes needed to move from the current state of the enterprise to the goals and conditions expressed by the target architecture cannot be achieved in a single quantum step. Evolving the enterprise from its baseline to the target architecture needs multiple concurrent interdependent activities and incremental builds. The best way to understand and control this complex evolutionary process is by developing and maintaining a systems sequencing plan. The sequencing plan should provide a step-by-step process for moving from the baseline architecture to the target architecture. The succession from one point in time to the next, and on to the target timeframe, establishes a migration sequence.

VA's Enterprise Architecture will include a detailed sequencing plan to address the evolution of the baseline to the target architecture. Elements of the sequencing plan will include:

- program/business improvement projects,
- infrastructure and technology upgrades,
- alignment strategies, and
- critical path migration.

5.0 Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture

5.1 Introduction

The efficacy and value of the Department's Enterprise Architecture must be constantly assessed. This chapter describes the methods and systems used to evaluate the effectiveness of VA's Enterprise Architecture and continuously seek ways to improve it. VA will establish processes to assess its Enterprise Architecture against best industry and government practices and establish processes to assess individual proposals for system/architectural compliance and changes.

From the global perspective, progress towards achieving the operating VA's strategic goals, as stated in VA's Strategic Plan will be used to measure the success of VA's Enterprise Architecture. From the perspective of specific VA Enterprise Architecture goals and individual information technology initiatives, VA will incorporate specific measurements in each project and program appropriate to each.

VA's Chief Enterprise Architect will collaborate with others to ensure that VA's Enterprise Architecture oversight is accomplished.

5.2 Evaluation and Assessment Process Responsibilities

As described in *Chapter 2: Enterprise Architecture Governance in VA*, proposed initiatives, with Information Technology Board recommendation, are submitted to the Strategic Management Council for review, and to VA's Executive Board for approval, modification, or rejection as part of the information technology planning process. The Chief Enterprise Architect will continue to evaluate and review Strategic Management Council approved information technology initiatives for VA Enterprise Architecture compliance.

Recognizing that full compliance will have to be phased in over time, if the Chief Enterprise Architect determines that a project does not comply with VA's Enterprise Architecture, the Chief Enterprise Architect will recommend a remediation plan to the Information Technology Board to bring the project into alignment. If, at any time, the Chief Enterprise Architect believes a project does not comply with VA's Enterprise Architecture, the Chief Enterprise Architect will recommend to the Information Technology Board that the initiative be terminated, suspended, or redefined.

The Chief Enterprise Architect will provide the Information Technology Board and Strategic Management Council with regular reports concerning all approved projects focusing on its overall VA Enterprise Architecture outcome and progress, as well as required project management, security, and organizational change concerns.

5.3 Integrated Evaluation and Assessment Process

VA will continuously assess the effectiveness and efficiency of its overall VA Enterprise Architecture. VA will use a balanced measures approach to review progress and results associated with Enterprise Architecture development and implementation. As such, we will measure outcomes, process management, program/business and technical alignment, customer satisfaction, employee satisfaction, and other factors.

The evaluation process will consider the phases of the *Architecture Alignment and Assessment Guide* developed by the Chief Information Officer Council and the *Information Technology Investment Management Framework provided by the General Accounting Office*. These phases of analysis are shown in Figure 5.

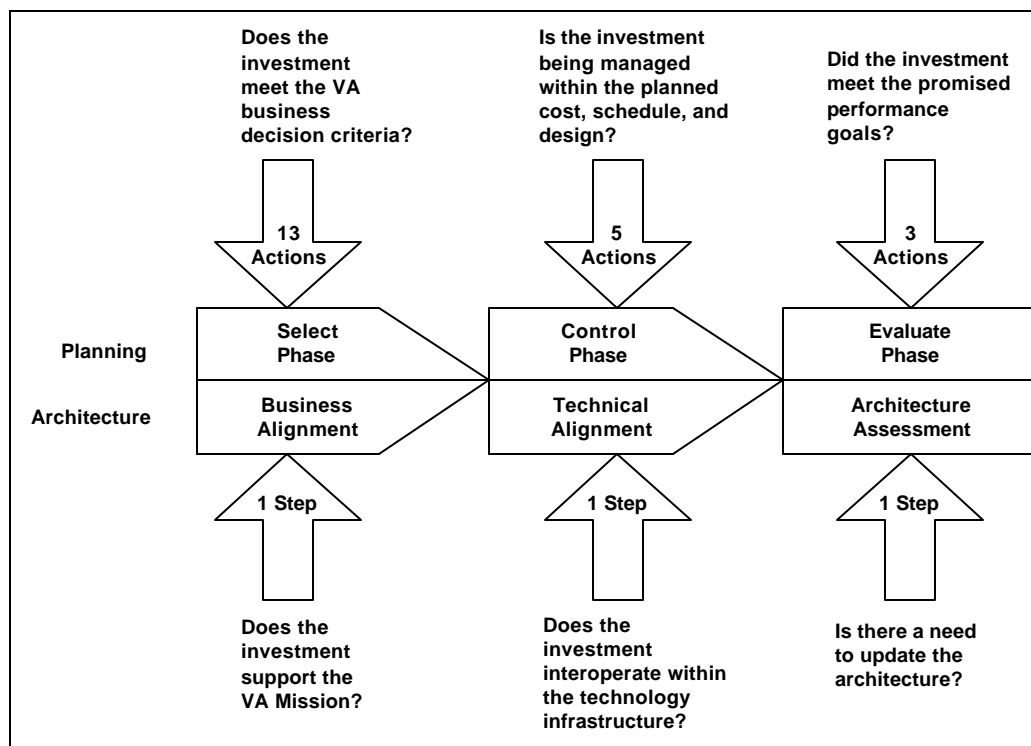


Figure 5. VA's Information Technology Capital Planning Phases

As described in *Chapter 2: Enterprise Architecture Governance in VA*, the Department will use the information technology planning process and capital planning processes to ensure that information technology investments consistently support strategic goals. All information technology projects must align with the Department's mission and support Departmental program/business needs while minimizing risks and maximizing returns throughout the investment's life cycle. The target architecture and the sequencing plan provide information for the three phases of the capital planning and investment control process, (i.e., select, control, and evaluate) as follows:

- In the Select Phase, VA evaluates the proposed investments to determine if they meet program/business decision criteria.
- In the Control Phase, program/business and technical Enterprise Architecture compliance is monitored. Additionally, investments should be monitored as it evolves over time to ensure continued alignment as VA's strategy and program/business focus.
- In the Evaluate Phase, a final assessment is performed to determine technical and strategic compliance with VA's Enterprise Architecture, as well as document lessons learned, feedback on project management and estimating accuracy, and organizational impacts. The results, including findings of noncompliance, should influence strategic and tactical planning for new program/business and information technology projects (which could then lead to changes in VA's Enterprise Architecture).

VA will accomplish progress toward the target architecture through programs and projects. New and follow-on projects are initiated and selected, executed and controlled, and completed and evaluated. Every step in this process requires specific measures.

5.3.1 Initiating Project Assessment and Selection

Figure 6 depicts the information flow when a project is initiated. It serves as a guide through the cycle of proposal preparation, aligning the proposed project with VA's Enterprise Architecture, and making the decision to fund the effort. The information flow ensures that requirements are being addressed and that a proposed implementation meets expectations and requirements.

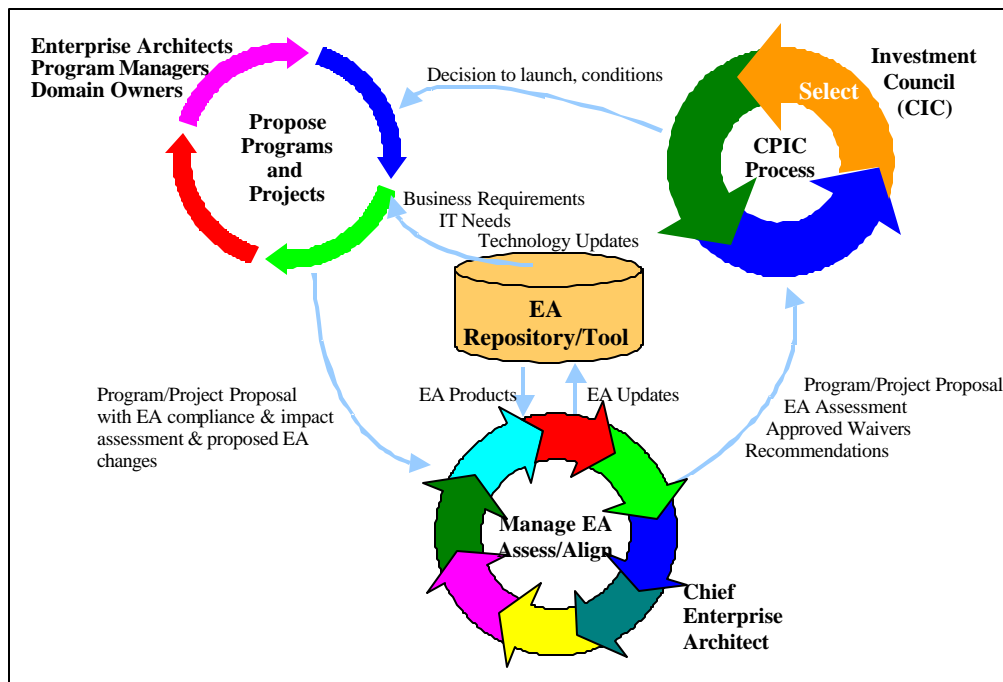


Figure 6. VA's Information Technology Initiative Assessment Process

Table 2 describes the main types of assessments that occur. In the initial phase of defining and selecting a project, the emphasis is on the program/business alignment, program/business case solution, location in the sequencing plan, and to a limited degree technical compliance. As the proposed project's concept matures, program/business and technical compliance are more equally addressed.

Table 1. Program Assessment Criteria

Type of Enterprise Architecture Reviews	Review Purpose/Goal
Program/business alignment assessment	Determine if the proposed project aligns with the VA's strategic plans, goals, values, and objectives. The goal of the review is to ensure that the expected outcomes of the project are aligned to program/business and high-level VA Enterprise Architecture requirements.
Program/business and technical case solution	Examine the proposed solution, at a high level, to determine the impact on the organization's information technology environment. The goal of the review is to ensure that the proposed solution supports both the program/business and technical architecture.
Sequencing plan assessment	Determine whether the proposed investment is consistent with the sequence and priorities in the VA's Enterprise Architecture and information technology plans. The goal of the review is to ensure progress toward the target architecture.
Architecture alignment assessment	Determine whether the architecture of the proposed solution complies with the enterprise standards (including security), VA's Enterprise Architecture, and project methodologies. The goal of this review is to ensure VA's Enterprise Architecture compliance of information technology projects as well as assess project management and organizational change concerns.
Security architecture assessment	Determine that the proposed solution is compliant with VA standards and policies to ensure confidentiality, integrity, and availability.
Post-implementation assessment	Compare performance promised in the initial proposal, program/business case, and requirements to actual performance of the systems in production. Evaluate the ROI to validate estimated benefit.

Upon assessing the project's compliance with VA's Enterprise Architecture, VA's Chief Enterprise Architect will make recommendations and provide support to help bring non-compliant proposals into compliance. In cases where a waiver has been requested, the Chief Enterprise Architect will respond with an independent assessment of operational, economic, productivity, and other impacts of granting

such a waiver, and make a recommendation to the Information Technology Board.

5.3.2 Assessing Progress (Execute and Control Phase)

The Chief Enterprise Architect is responsible and accountable to the Information Technology Board for maintaining VA Enterprise Architecture compliance once funding is committed and a project is initiated. Figure 7 depicts the information flow as the project cycles through the integrated VA Enterprise Architecture, systems life cycle, and capital planning and investment control processes. A project will pass through this cycle multiple times. There are continuous periodic interactions between the project implementers and the architecture governance process with more formal reviews at prescribed milestones.

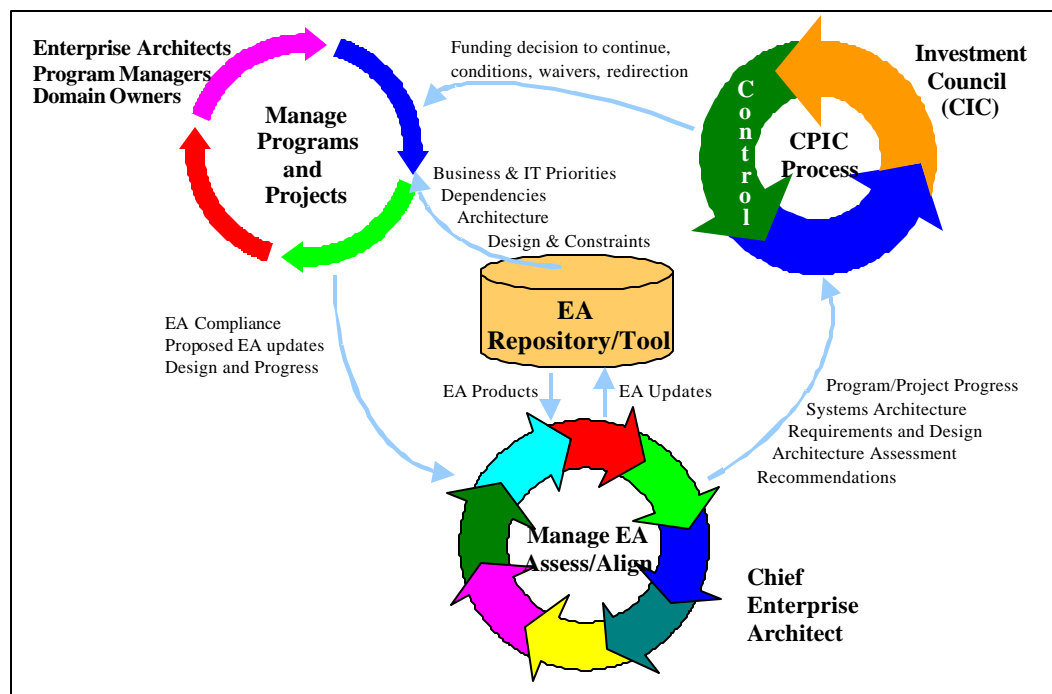


Figure 7. VA's Monitoring In-Development Projects (Execute/Control Phase)

In the control phase, assessment assures that the investment is being managed within the planned cost, schedule, design, and VA Enterprise Architecture compliance. Status and deliverable information is provided by the project management process. The Chief Enterprise Architect and Investment Technology Board will use this information as the basis for recommendations and decisions about continued funding, refocus, imposition of development constraints, technical modifications, or possible redirection of technical efforts. This is necessary to manage and mitigate risks, because other investment decisions rely on analysis of progress reports and compliance assessments to arrive at

implications on the total cost, schedule, and performance of the overall VA Enterprise Architecture.

5.3.3 Completing the Project Assessment (Evaluate Phase)

Most projects are interdependent with other development projects and legacy systems. Many require additional increments of capability or modifications provided by additional operations and maintenance efforts. When the project is complete, there is a final assessment of impacts on the Department, VA's Enterprise Architecture, program/business operations, other projects in the sequencing plan, and consequently future investment and funding decisions. Figure 8 shows the information flow upon completion of a program or project.

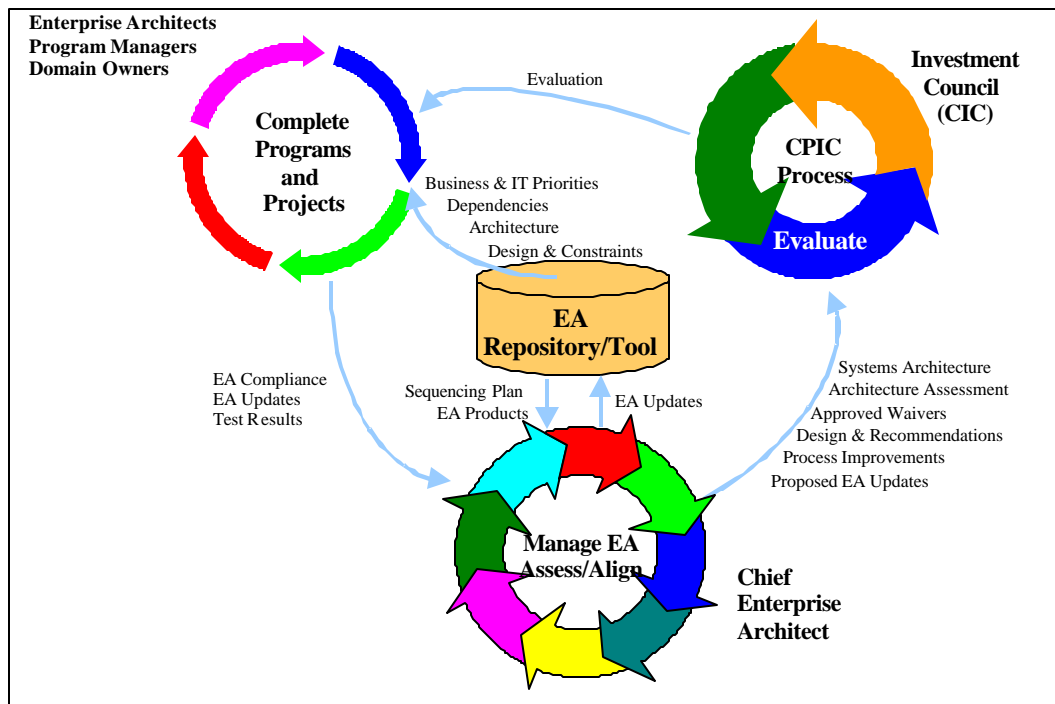


Figure 8. VA's Assessment of Completed Projects (Evaluate Phase)

The Chief Enterprise Architect performs an assessment of the project's implications and impacts on VA's Enterprise Architecture and other concerns as required. VA gains valuable information by evaluating the extent to which a project complies with the sequencing plan and target architecture. The experience and lessons learned contribute to the ongoing robustness of VA's Enterprise Architecture.

The result of the final assessment is the updating of the baseline architecture with changes implemented in program/business processes, information technology products, deployment, technology, and operations. The sequencing plan, target architecture, and gap/transition analyses are also updated to show completion of the program/project. These results provide lessons learned for process

improvement and form the basis of program/business cases for new programs and projects. The experience and lessons learned contribute to the ongoing evolution of VA's Enterprise Architecture.

5.4 VA's Enterprise Architecture Evolution and Evergreening

VA's Enterprise Architecture, like VA itself, is in a continuous state of evolution and maturity. As the program/business context evolves, VA's Enterprise Architecture must transform to adapt to the changing program/business context. Each revision of the Enterprise Architecture should improve and elaborate upon the previous. This process is shown in Figure 9.

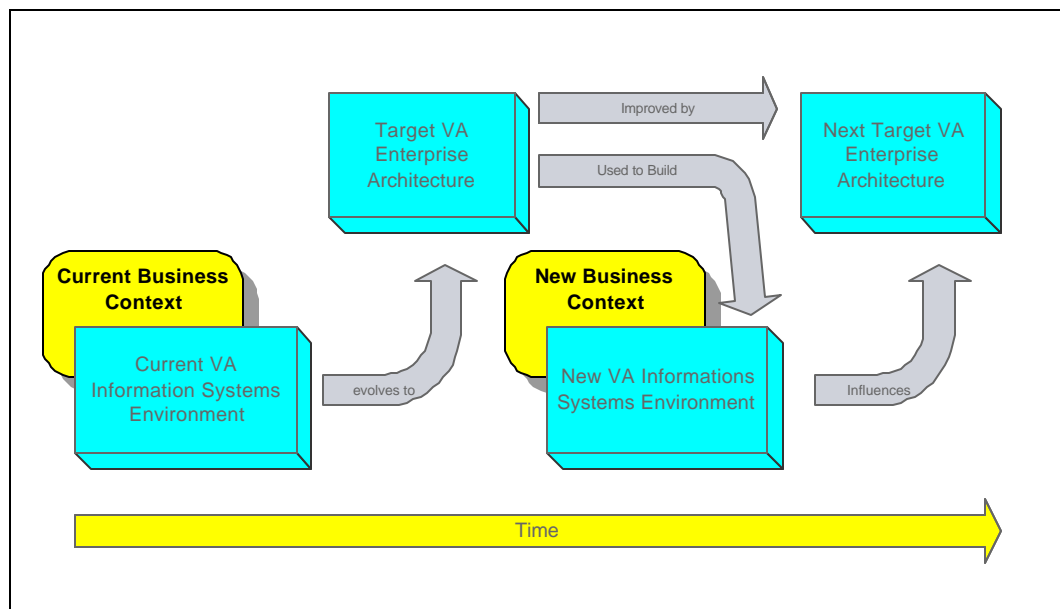


Figure 9. VA's Enterprise Architecture Evaluation, Evolution, and Evergreening Process

Some of the *triggers* that can cause such changes to occur are:

- Changes in legal or program/business requirements.
- Changes in prevailing VA Enterprise Architecture environment.
- Advances in technology or methods.

VA's Enterprise Architecture is changed in response to specific changes in the program/business context requirements, technological advances, or funded projects. Therefore, this will require a continuous evaluation of the Enterprise Architecture.

5.4.1 Evolution from Baseline to the Target VA Enterprise Architecture

The Chief Enterprise Architect will perform an annual evaluation of the progress made in moving from the baseline to the target VA Enterprise Architecture. This will be based on an analysis of the execution of VA's Enterprise Architecture sequencing plan. The evaluation will document progress made, slippage in schedule, adherence to budget, impact of the slippage and cost overruns, proposed remedial actions, as well as impact on achievement of VA goals and objectives. It may also suggest changes to the target architecture and sequencing plan.

The Chief Enterprise Architect has custodial responsibility for maintaining all architectural products.

5.4.2 Evergreening

VA will produce and maintain VA's Enterprise Architecture by use of an evergreening process, consistent with the continuous changes occurring within an enterprise and thus its architecture. Evergreening is an open, collaborative-process philosophy that involves continuous improvement of Enterprise Architecture through stakeholder involvement and improving practices. In particular, these stakeholders include VA's Chief Enterprise Architects and Chief Information Officers as well as program/business stakeholders from each Administration and Staff Office, and veterans service organizations, suppliers, other Federal agencies, and information technology staff.

Only through this continuous evolution, or evergreening, can VA's Enterprise Architecture best ensure that information technology decisions continue to support the Department's VA missions, goals, and program/business needs. The cycle of evergreening and publication is repeated often enough to reflect changes, but not so often as to create unnecessary burdens. Publication of VA's Enterprise Architecture will occur as needed; although access to VA's Enterprise Architecture repository should be ongoing.

Based on the evaluation of the overarching VA Enterprise Architecture and specific information technology initiatives, the Department will identify opportunities for improvement. Quality improvement initiatives will be implemented using a continuous quality improvement process and a program/business process reengineering approach that will focus on technical, organizational, and program/business issues. For each issue area identified quality improvement initiatives will be planned and implemented.

Periodically, it is necessary to revisit the vision and objectives and re-energize and redirect VA's Enterprise Architecture. In conjunction with the VA's strategic planning process, the Enterprise Architecture should be reviewed to ensure that:

- The current or baseline architecture accurately reflects the current status of VA's information technology infrastructure.

- The target architecture accurately reflects the program/business vision of the enterprise and appropriate technology advances.
- The sequencing plan reflects the prevailing priorities of the enterprise and resources that will be realistically available.
- Security architecture accurately reflects current security policies and controls.

The assessment could generate an update to VA's Enterprise Architecture and corresponding changes in sequencing plan projects. The baseline architecture should continue to reflect actions taken to implement VA's Enterprise Architecture sequencing plan and actions otherwise taken to upgrade the legacy environment as the organization modernizes. VA's Enterprise Architecture assessment and update should be managed and scheduled to in turn update VA's strategic plan and process for selecting system investments. VA's Enterprise Architecture reflects the evolution of the Department, and should continuously reflect the current state (baseline architecture), the desired state (target architecture), and the long- and short-term strategies for managing the evolution of the enterprise (the sequencing plan) to better serve veterans.

Appendices

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Object Management Group <<http://www.omg.org/>>

Software Engineering Institute (SEI) Architecture Technology Page <<http://www.sei.cmu.edu/>>

Steven Spewak Enterprise Architecture Planning Home Page <<http://www.eap.com>>

Stanford University, Enterprise Architecture Home Page <<http://www.stanford.edu/group/APS/arch/index.html>>

The Open Group Architecture Framework (TOGAF) Technical Reference Model, version 5, 1999. <<http://www.opengroup.org/togaf>>

UML – Unified Modeling Language <<http://www.omg.org/uml>>

Zachman Institute for Framework Advancement <<http://www.zifa.com/>>

Appendix B: Preliminary Project Timeline

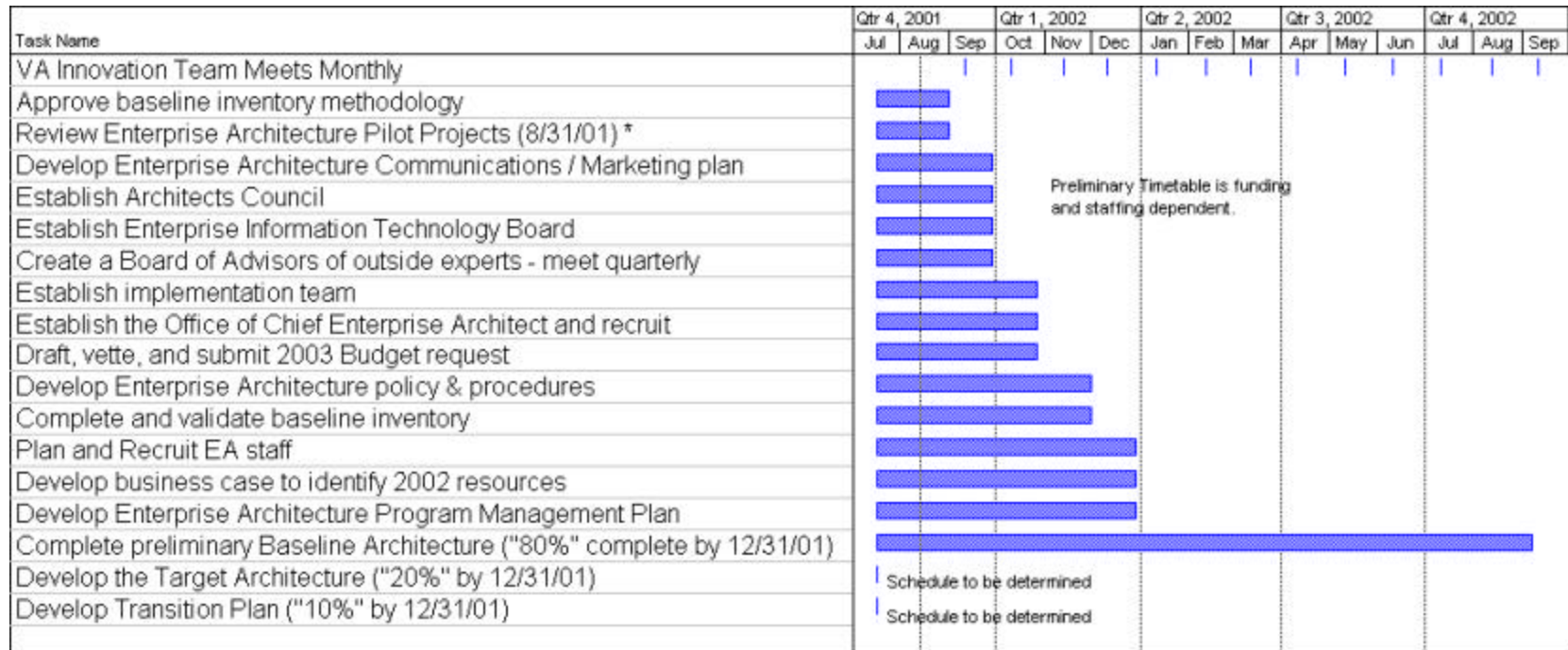


Figure 10. Preliminary Project Timeline

* Due to their complexity and possible importance to VA, the VA Enterprise Architecture Innovation Team identified three initiatives to serve as Enterprise Architecture pilot projects:

- CoreFLS
- One VA Registration/Eligibility
- HealtheVet

Appendix C: Credits

The Department of Veterans Affairs Enterprise Architecture Team produced this document with facilitation and assistance from a team of process and subject matter experts following the format of a “Thinking Expedition.” The following individuals contributed to this endeavor.

Table 2. Credits

Name	Title	Agency
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Mark Durocher	Director, Information Systems Service, National Cemetery Administration	Department of Veterans Affairs
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K. Adair Martinez	Chief Information Officer, Veterans Benefits Administration	Department of Veterans Affairs
Guy McMichael III	Acting Assistant Secretary for Information Technology	Department of Veterans Affairs
Ed Meagher	Special Assistant to the Secretary	Department of Veterans Affairs
Laura J. Miller	Assistant Deputy Under Secretary for Health, Veterans Health Administration	Department of Veterans Affairs
Irwin Pernick	Associate Deputy Assistant Secretary for Policy, Office of Policy and Planning	Department of Veterans Affairs

Name	Title	Agency
VA Enterprise Architecture Innovation Team (continued)		
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Dan Tucker	Director, Office of Finance and Planning, National Cemetery Administration	Department of Veterans Affairs
Donald J. Williams	Chief Technology Officer, Veterans Benefits Administration	Department of Veterans Affairs
Al Zuech	Director of Operations, Office of Information and Technology	Department of Veterans Affairs
Guidance and Facilitation Team		
Mike Beyerlein	Team Development and Process Expert; Change Management Expert; Professor and Director	Center for the Study of Work Teams, University of North Texas
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Grant Goldin	Team Process Facilitator; Guide, Thinking Expedition	Office of Strategic Innovation, Inc.
Leon Kappelman	Lead Project Facilitator and Information Technology Management Expert; Professor and Director	IS Research Center, University of North Texas; Solutions-Organizations-Systems, Inc.
Robert McKeeman	Project Manager; Information Technology Quality and Project Management Expert	Change Management Consulting, Inc.
Al Patzke	Sr. Technical Communicator and Documentation Expert	Integrated Documentation, Inc.
Aurora Sanchez	Information Technology Evaluation and Assessment Expert	IS Research Center, University of North Texas
Durwin Sharp	Team Process Facilitator; Chief Idea Catalyst, Thinking Expedition	Office of Strategic Innovation, Inc.
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Name	Title	Agency
Subject Matter Experts		
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Judy Glick-Smith	President and CEO	Integrated Documentation, Inc.
Gil Held	Consultant and Author	4-Degree Consulting
Chang Koh	Assistant Professor	University of North Texas
Jerry Luftman	Professor and Director	Stevens Institute of Technology
Jack Murphy	Director, Enterprise Security Architecture; EDS Fellow	EDS
Paul Perchersky	Director	Gartner Consulting
Alex Petit	Director of Information Services	City of Denton, Texas
Victor Prybutok	Professor and Director	Center for Quality and Productivity, University of North Texas
William Rosser	Vice President and Research Director	Gartner Consulting
Emilie Schmidt	Consultant (formerly CIO – State of North Carolina)	Candle Corporation
Kathie Sowell	Consultant	Mitre Corporation
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Bob Terdeman	Chief Data Warehouse Architect	EMC
Rob Thomas	Director and Chief Architect	US Customs Technology and Architecture Group
Mike Tiemann	Acting Associate CIO for Architecture	U.S. Department of Energy
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Ed Yourdon	Chairman and Co-founder	Cutter Consortium
John Zachman	Chairman	Zachman Institute for Framework Advancement

Appendix D: Executive Summary [Annotated]

This document presents the Department of Veterans Affairs (VA) Enterprise Architecture strategy that was developed and unanimously approved by the VA Enterprise Architecture Innovation Team. Established by the Secretary of Veterans Affairs, this team, made up of VA senior management business line and information technology professionals, identified and adopted the Zachman Enterprise Architecture framework to organize VA's Enterprise Architecture, and decided how that architecture will be governed and implemented. The strategy provides for a governance system based on decentralized implementation of information technology and centralized management of Enterprise Architecture in an atmosphere of collaboration, accountability, and oversight.

The Enterprise Architecture Innovation Team crafted the VA Enterprise Architecture mission in May 2001 and, over the course of the next 60 days, worked together through many intense long weekend sessions to develop a VA Enterprise Architecture strategy that will be sustainable over time. Guided by the strategic objectives of VA, this strategy is consistent with the legal requirements of the Clinger-Cohen Act and OMB A-130 [see *Appendix E: OMB A-130 Analysis*]. The mission statement is as follows:

“The mission of VA’s Enterprise Architecture is to develop and implement an evolutionary, high-performance One-VA information technology architecture aligned with our program/business goals that enables enterprise-wide data integration. VA’s Enterprise Architecture will enable us to provide an accessible source of consistent, reliable, accurate, useful, and secure information and knowledge to veterans and their families, our workforce, and stakeholders to support effective delivery of services and benefits, enabling effective decision-making and understanding of our capabilities and accomplishments. The Enterprise Architecture will support VA’s overall strategic goals.”

This document is strategic. It provides general guidelines on what needs to be done, who will do it, and when it will be completed. As examples, and for additional guidance, incorporated, by reference and in the appendices, are some tactical and operational details including a preliminary listing of implementation action items and a timetable. It contains sufficient detail to demonstrate that VA can and will, implement and use Enterprise Architecture in a manner that has utility and will be institutionalized as the new way in which information assets are developed and managed in VA. This Enterprise Architecture strategy is an important reference for VA enterprise architects, executives, program/business managers, and information technology managers and workers. Many of VA's 200,000+ staff will refer to this strategy to better understand technology planning and implementation. It represents a new beginning.

VA's Enterprise Architecture is the "blueprint" for systematically and completely defining and documenting the organization's current (baseline) and desired (target) environment, and includes a sequencing plan for transitioning from the baseline environment to the target environment [2.2, 3.5, 4.0, 5.4]. VA's Enterprise Architecture strategy is essential for evolving its information systems and developing new systems with optimized mission value. This is accomplished in program/business terms (e.g., mission, objectives, goals, program/business functions, and information flows) and technical terms (e.g., software, hardware, data, communications, and system environments).

VA's Enterprise Architecture builds on the interdependencies and interrelationships within VA's program/business operations facilitating the development of information technologies supporting those operations. Both the Office of Management and Budget and the General Accounting Office report that without a complete and enforced Enterprise Architecture, Federal agencies run the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and interface.

Using a disciplined and rigorous approach, this strategy guides VA in defining, implementing, using, and maintaining its Enterprise Architecture. It describes major Enterprise Architecture governance and program management areas, including organizational structure and management controls [2.0], a process for the development of a baseline and target architecture and the development of a sequencing plan [4.0]. It also describes Enterprise Architecture maintenance and implementation [4.3, 4.4, 4.5], as well as oversight, control, evaluation, assessment, resource allocation, and project management [1.4, 2.0, 5.0]. It is organized into five main chapters, a brief description of which follows:

- **The Foundation of VA's Enterprise Architecture** [1.0] – This chapter addresses the missions of VA and its Enterprise Architecture, as well as the goals and objectives [1.2, 1.3], guiding principles and legislation [1.5, 1.6], uses and benefits, strengths, issues, challenges, opportunities [1.4], and the need and audience for an Enterprise Architecture in VA [1.7, 1.8].
- **Enterprise Architecture Governance in VA** [2.0] – This chapter explains the governance process for developing and maintaining VA's Enterprise Architecture, and how Enterprise Architecture compliance is integrated with VA's governance processes [2.3]. This chapter provides direction on who has responsibility and authority to develop and maintain VA's Enterprise Architecture [2.4], and how Enterprise Architecture compliance is integrated into VA's overall information technology investment review and project approval processes [2.5, 2.6]. It also includes consideration for security [2.3.1, 3.5, 5.3.1], improved project management, and the sociological aspects of managing change [2.3.1].
- **VA's Enterprise Architecture Framework Selection & Use** [3.0] – This chapter describes the Zachman Framework which was chosen to organize VA's Enterprise Architecture [3.4]. It discusses how an architecture is

used, its scope and depth [3.2.1, 3.2.2, 3.2.3, 3.5]; and the selection criteria used by VA's Enterprise Architecture Innovation Team [3.2, 3.3].

- **Development & Deployment of VA's Enterprise Architecture** [4.0] – This chapter provides a high-level overview of VA's development and implementation of an Enterprise Architecture "blueprint" using the Zachman Framework. Outlining the essential elements, this chapter provides guidance concerning definition and development [4.1, 4.2, 4.3], organizational structure and management controls [4.2.1], processes for development and maintenance of baseline and target architectures [4.3, 4.4.2, 4.5, 5.4], and of a sequencing plan for evolving information technologies in order to optimize their mission value [4.5.2].
- **Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture** [5.0] – This chapter describes the methods and processes used to evaluate the effectiveness of VA's Enterprise Architecture [5.2, 5.3, 5.4]. The efficacy and value of the Department's Enterprise Architecture must be constantly assessed.

Appendix E: OMB A-130 Analysis

Analysis of the Department of Veterans Affairs “Enterprise Architecture: Strategy, Governance, & Implementation” Document Version 10.0 in Relation to OMB A-130 Requirements.

Table 3. OMB A-130 Analysis

OMB A-130	VA EA Chapters and Sections	Page(s)
<p>8 b.1 Agencies must establish and maintain a capital planning and investment control process that links mission needs, information, and information technology in an effective and efficient manner. The process will guide both strategic and operational IRM, IT planning, and the Enterprise Architecture by integrating the agency's IRM plans, strategic and performance plans.</p> <p>The agency's capital planning and investment control process must build from the agency's current Enterprise Architecture (EA) and its transition from current architecture to target architecture.</p>	<p>2.0 Enterprise Architecture Governance in VA</p> <p>2.3 Overview of VA Governance and Enterprise Architecture Governance</p> <p>2.5 Integrating VA’s Enterprise Architecture with VA's Information Technology Investment and Project Approval Processes</p>	<p>13-16</p> <p>18-19</p>
<p>8.b.2.a An EA is the explicit description and documentation of the current and desired relationships among business and management processes and information technology. It describes the "current architecture" and "target architecture" to include the rules and standards and systems life cycle information to optimize and maintain the environment which the agency wishes to create and maintain by managing its IT portfolio.</p> <p>The EA must also provide a strategy that will enable the agency to support its current state and also act as the roadmap for transition to its target environment. These transition processes will include an agency's capital planning and investment control processes, agency EA planning processes, and agency systems life cycle methodologies</p>	<p>1.0 The Foundation of VA’s Enterprise Architecture</p> <p>1.1 Introduction</p> <p>1.3 VA Enterprise Architecture Mission, Goals, and Objectives</p> <p>1.4 VA Enterprise Architecture Strategic Strengths, Issues, Challenges, and Opportunities</p> <p>1.5 VA’s Enterprise Architecture Guiding Principles</p> <p>3.0 Enterprise Architecture Framework Selection & Use</p>	<p>1</p> <p>2-4</p> <p>4-6</p> <p>6-8</p>

OMB A-130	VA EA Chapters and Sections	Page(s)
	<p>3.4 Enterprise Architecture Framework Choice: The Zachman Framework for VA's Enterprise Architecture</p> <p>4.0 Development & Deployment of VA's Enterprise Architecture</p> <p>4.2 Developing the VA Enterprise Architecture</p> <p>4.3 Designing, Developing, and Maintaining VA's Enterprise Architecture Information Repository</p> <p>4.5 Establishing, Updating, and Realizing VA's Target Architecture</p> <p>5.0 Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture</p> <p>5.3 Integrated Evaluation and Assessment Process</p>	<p>23-25</p> <p>27-29</p> <p>29-30</p> <p>32-33</p> <p>36-40</p>
<p>8.b.2.a. The EA will define principles and goals and set direction on such issues as the promotion of</p> <p>interoperability,</p> <p>open systems,</p> <p>public access,</p> <p>compliance with GPEA,</p> <p>end user satisfaction, and</p> <p>IT security</p>	<p>1.0 The Foundation of VA's Enterprise Architecture</p> <p>1.3 VA Enterprise Architecture Mission, Goals, and Objectives</p> <p>1.5 VA's Enterprise Architecture Guiding Principles</p>	<p>2-4</p> <p>6-8</p>
<p>8.b. 2.a Agencies must implement the EA consistent with following principles:</p> <p>(i) Develop information systems that facilitate interoperability, application portability, and scalability of electronic applications across networks of heterogeneous hardware, software, and telecommunications platforms;</p>	<p>1.0 The Foundation of VA's Enterprise Architecture</p> <p>1.5 VA's Enterprise Architecture Guiding Principles</p>	<p>6-8</p>

OMB A-130	VA EA Chapters and Sections	Page(s)
<p>(ii) Meet information technology needs through cost effective intra-agency and interagency sharing, before acquiring new information technology resources; and</p> <p>(iii) Establish a level of security for all information systems that is commensurate to the risk and magnitude of the harm resulting from the loss, misuse, unauthorized access to, or modification of the information stored or flowing through these systems</p>		
<p>8.b.2.b As part of the EA effort, agencies must use or create an Enterprise Architecture Framework. The Framework must document linkages between mission needs, information content, and information technology capabilities.</p>	<p>3.0 Enterprise Architecture Framework Selection & Use</p>	<p>21-26</p>
<p>8.b.2.b In the creation of an EA, agencies must identify and document:</p> <p>(i) Business Processes.</p> <p>(ii) Information Flow and Relationships -.</p> <p>(iii) Applications -.</p> <p>(iv) Data Descriptions and Relationships -.</p> <p>(v) Technology Infrastructure -</p>	<p>3.0 Enterprise Architecture Framework Selection & Use</p> <p>3.2 Basic Concepts</p> <p>4.0 Development & Deployment of VA's Enterprise Architecture</p> <p>4.3 Designing, Developing, and Maintaining VA's Enterprise Architecture Information Repository</p>	<p>21-22</p> <p>29-30</p>
<p>8.b.2.c What are the Technical Reference Model and Standards Profile? The EA must also include a Technical Reference Model (TRM) and Standards Profile.</p> <p>(i) The TRM identifies and describes the information services (such as database, communications, intranet, etc.) used throughout the agency.</p> <p>(ii) The Standards Profile defines the set of IT standards that support the services articulated in the TRM. Agencies are expected to adopt standards necessary to support the entire EA, which must be enforced consistently throughout the agency.</p>	<p>4.0 Development & Deployment of VA's Enterprise Architecture</p> <p>4.4 Incorporating and Maintaining VA's Technical Reference Model and Standards Profile</p>	<p>30-32</p>

OMB A-130	VA EA Chapters and Sections	Page(s)
(iii) As part of the Standards Profile, agencies must create a Security Standards Profile that is specific to the security services specified in the EA and covers such services as identification, authentication, and non-repudiation; audit trail creation and analysis; access controls; cryptography management; virus protection; fraud prevention; detection and mitigation; and intrusion prevention and detection.		
<p>8.b.3 How Will Agencies Ensure Security in Information Systems?</p> <p>Agencies must incorporate security into the architecture of their information and systems to ensure that security supports agency business operations and that plans to fund and manage security are built into life-cycle budgets for information systems.</p>	<p>1.0 The Foundation of VA's Enterprise Architecture</p> <p>1.5 VA's Enterprise Architecture Guiding Principles</p> <p>3.0 Enterprise Architecture Framework Selection & Use</p> <p>3.5 Framework Products of Special Note</p> <p>4.0 Development & Deployment of VA's Enterprise Architecture</p> <p>4.4 Incorporating and Maintaining VA's Technical Reference Model and Standards Profile</p> <p>5.0 Evaluation, Evolution, & Evergreening of VA's Enterprise Architecture</p> <p>5.3 Integrated Evaluation and Assessment Process</p>	<p>6-8</p> <p>25-26</p> <p>30-32</p> <p>36-41</p>